the OIL AND GAS JOURNAL

NOVEMBER 14, 1955

Depth Record Falls; Hole Going Deeper

p. 130

What's ahead for 1956?

Journal Forecast: Demand will top 9,000,000 barrels for the first time

p. 118

Why was our well dry?

Are you sure it was? These charts and questions will help to decide

p. 143

L.A. refiners attack smog

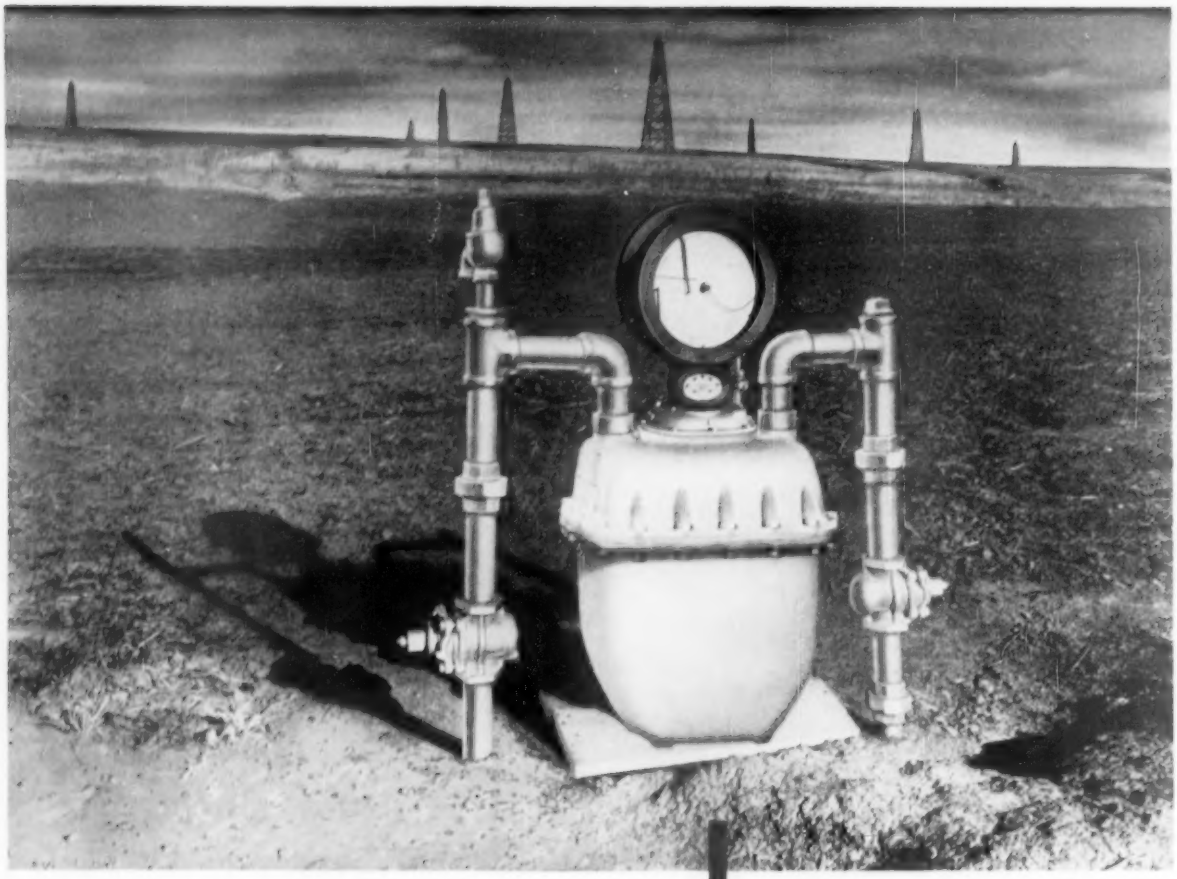
They're moving in on three fronts—and they're meeting with success

p. 160

Pre-A.P.I. number

What's coming up at the meeting

p. 122



Rockwell "800" meter with combined Record Gauge measuring gas at 75 lb pressure in Kansas field.

It's Just What You Need!

FOR MEASURING FIELD GAS

The Rockwell "800" provides the *light* answer to most field measurement problems. Made with a sturdy *single joint* aluminum alloy case, this meter has high impact resistance and will stand up under all kinds of weather. This same all-aluminum construction holds the weight down to a mere 68 lbs; makes the "800" meter easy to install and readily portable. The generous capacity rating of 1600 cfh of 4 oz inlet gas* can be increased materially by measuring gas at higher pressures. Correction to base volume is then accomplished with either a Rockwell Combined Record Gauge or Emcorector. The meter has a working pressure rating of 100 psi. Steel spud top connections are standard. The "800" is only one of a complete line of Rockwell meters having capacity ratings from 150 to 10,000 cfh. Write for literature.

*Rated at 2" pressure absorption of 0.60 sp gr gas.

ROCKWELL MANUFACTURING COMPANY

Pittsburgh 8, Pa. Atlanta Boston Charlotte Chicago Dallas Houston Los Angeles Midland, Texas N. Kansas City, Mo. New York Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa

MIGHTY USEFUL FOR ALL THESE PURPOSES

- Lease Accounting
- Inter-Company Reports
- Intra-Company Sales
- Pipe Line Taps
- Field Processing
- Irrigation Fuel Service

You Can Rely on Rockwell

Rockwell "800" *Aluminum* Gas Meters

A glance ahead . . . at press time

These trends will make TOMORROW'S NEWS

Texas geologists are eyeing that state's Palo Duro basin as the next big target for exploration. Located south of the Amarillo uplift, this big basin is a northern extension of the great Midland basin of West Texas, separated from it only by the buried granite peaks of the Matador arch.

New method of secondary recovery, based primarily on use of superheated steam as source of reservoir pressure and formation heat, is being tried out by a large oil company in a supersecret pilot flood, well concealed in a remote area.

A new well completion technique is scheduled for experimental use in a California field. The method is pointed to segregating oil sands. Working principle is through use of telescoping horizontal magnesium pistons which are dissolved after the cement sets around the casing. A magnesium base cement which expands while curing is used in the operation.

Alabama drilling will be stepped up even more, following the Lower Cretaceous discovery at Citronelle in the southwestern part of the state. Spearheading the move are five new tests under way in the immediate area. Gulf Oil has three running; Lamar Hunt has one south of the discovery well; Zach Brooks has one running in the area.

Current seismic activity on the northeastern shelf of the Anadarko basin in north central Oklahoma is a forerunner of an expanded campaign. Oil companies feel the present seismic surveys will be more successful in finding the elusive oil fields that should be present. Facies changes and velocity problems that rendered the previous shooting in this area invalid can now be corrected.

Earlier predictions of about 100 offshore rigs in operation by January 1 appear to have fallen short. There are now about 60 active rigs on the Gulf Coast waters. This figure is not expected to increase, in fact, it has declined in recent weeks. The decline in active rigs, however, has been in the development areas. New wildcat locations have been on the increase.

When the final tally is in, the figures will show a record-breaking number of new oil wells. However, offshore fields excluded, it appears there have been no discoveries of the major field caliber to make a strong sizeable addition to the nation's reserves.

Look for the new wonder calculators—digital computers—to produce even more progress in reservoir engineering calculations. An increasing number of production research labs are installing these machines. Currently, gravity segregation problems of gas and oil in reservoirs are being solved in a matter of days rather than years needed for slide-rule calculations.

the OIL AND GAS JOURNAL

NOVEMBER 14, 1955 • VOLUME 54 • NUMBER 28

THE STAFF

TULSA OFFICE
211 South Cheyenne Ave.
Phone Diamond 3-6291

Kenneth B. Barnes ..... Editor
Henry D. Ralph ..... Chief Editorial Writer
Ted A. Armstrong ..... News Editor
Gerald L. Ferrar ..... Engineering Editor
Dr. Frank J. Gardner ..... Exploration Editor
Paul Reed ..... Pipeline Editor
John C. Reidel ..... Petrochemical Editor
C. O. Willson ..... Consulting Editor
W. L. Nelson ..... Technical Editor
Lynn M. Nichols ..... Presentation Editor
John C. Casper ..... Economics Editor
Neil Williams ..... Associate Editor
Norman S. Morrisey ..... Drilling-Development Editor
Robert G. Deering ..... Associate Pipeline Editor
R. B. Tuttle ..... Equipment Editor
W. A. Franklin ..... Assistant to Presentation Editor
Carl Hoot ..... District Editor
Carl J. Lawrence ..... District Editor
John C. McCaslin ..... District Editor
John M. McGivern ..... District Editor
W. A. Bachman ..... District Editor
Gene T. Kinney ..... District Editor
J. O. Scott ..... District Editor
LaWanda Turner ..... Readership Research
Helen Brown ..... Editorial Assistant
Alice Burt ..... Editorial Assistant
Aileen Cantrell ..... Editorial Assistant
C. Dudley Johnston ..... Art Director
Jo Jeanne Speaker ..... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-6160

George H. Weber ..... Refining Editor
Paul Swain ..... International Editor
Ray G. Gibson ..... District Editor

HOUSTON OFFICE
802 Sterling Building
Phone CApitol 4-7726

F. Lawrence Resen ..... District Editor
Edwin McGhee ..... District Editor
Joe Reilly ..... District Editor

DALLAS OFFICE
1238 Mercantile Bank Building
Phone STerling 3074

Robert J. Enright ..... District Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone VAndike 0722

D. H. Stormont ..... District Editor
William T. Smith ..... District Editor

WASHINGTON OFFICE
621 Albee Building
Phone DIstrict 7-1710

Bertram F. Linz ..... District Editor

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., Mount Pleasant, Mich., Melbourne, Australia; Regina, Sask.; Chatham, Ont.; and Casper, Wyo.

The Oil and Gas Journal, Published Mondays, copyright 1955, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $4, 2 years $7, 3 years $8.

IN THE NEWS

Economics:

Demand in 1956 to Break All Records 118
Jersey Announces $1.2-Billion Budget for '56 133

Of General Interest:

Annual A.P.I. Meeting Opens Today 122
Details of the A.P.I. Program 126
Gulf Buying Control of Warren Petroleum 129
Industry Briefs 133
Use of Isotopes in the Field Increasing 134
World's Smallest Atom Smasher Tested 136
Israel Signs Contract to Buy Russian Crude 142

Refining:

Imperial Puts New Lube Plant on Stream 127
Suntide Expanding Corpus Christi Refinery 128
Processing Briefs 139

Production:

Novel Dual-Completion Technique Disclosed 138
Exhaust Gas Injection Replaces Water Flood 138

Pipelines:

Trans-Canada Plans Taking Shape 139
Sinclair to Build 300-Mile Crude Line 139
193-Mile Gas Line Planned in Pakistan 142

Drilling:

Air Drilling to Get Wider Application 127
Louisiana Well Breaks Drilling-Depth Record 130
Platform Designed for 300-Ft. Water 132

Exploration:

Exploration, Development Planned in Iran 140
Oklahoma Still Springs Pleasant Surprises 261
Can Gravity Surveys Map Subsurface Structures? 263

OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

. . . and integrated magazine serving an integrated industry

Why Was My Well Dry?
(A Special Section)

Proper Interpretation of Geological Data 143

A few hours checking the validity of the geological data may eliminate a dry hole. Test possible shallow zones thoroughly. Check these and other factors listed for possible prevention of a dry hole by geological means.

Check Geophysical Pitfalls 148

Tie all geological and seismic data together. Check field techniques. Make seismic interpretations based on thorough knowledge of local or regional geology. Article lists these and other factors in detail.

Drilling and Test Techniques May Be Inadequate 152

Drilling rig or equipment may be too small. Mechanical defects may cause trouble. Pay zone information may be inadequate. Check details on these and other possible causes.

Plan Completion Practices Carefully 156

There may be problems in running pipe and cementing. Drilling in or perforating may be done improperly. Formation stimulation may be needed. Check details on these and other possible causes.

TECHNOLOGY—OPERATION

Los Angeles Refiners Move in on Smog 160

By D. H. Stormont

Los Angeles refiners halved the amount of pollutants which they release to the atmosphere, even though they initially accounted for very little of the smog problem. Oil companies have spent about $27,500,000 in this work. An outline of steps taken and some technical details of the procedures are included.

What You Should Know About Storage Tanks 170

By William E. Joor

This article gives points of design and economics which must be considered in choosing between cone and floating-roof tanks, and in checking a particular type floating roof.

Here's How Crude-Oil Purchasing Is Done 180

By Henry D. Ralph

A brief but comprehensive picture of the entire crude-oil purchasing operation. Particular attention is given to place occupied by the crude-oil man in the scheme. Article shows how oil is gathered, transported, and delivered to refineries in orderly fashion.

On the Job . . . In the Fields 197

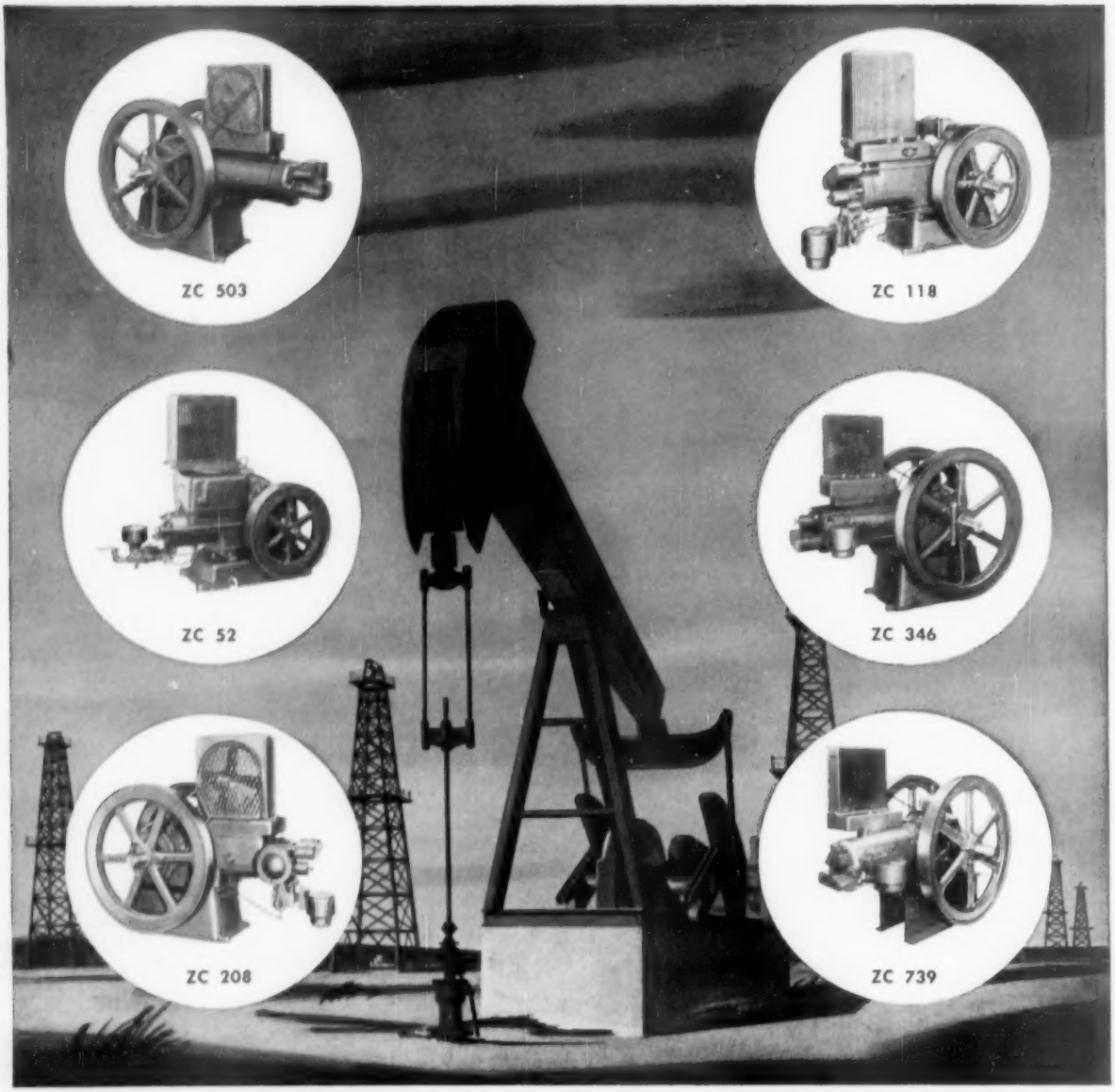
How wrought iron beats salt-water corrosion on an offshore platform . . . How to take care of blowout preventers . . . Well-designed trap farm serves eight wells . . . Testing wildcat with portable separator and tank . . . Using time-cycle controller to control gas-oil ratios . . . Easier way to take drilling line off a spool.

DEPARTMENTS

A Glance Ahead	1	Drilling Contractors	223
They Say	99	Pipeline Patrol—Construction	211
Calendar of Events	108	Equipment Men in News	241
Journally Speaking	111	Exploration Highlights	261
Editorial	113	Personals	295
This Week	117	Statistical Summary	298
Watching Washington	137	Drilling Statistics	299
International News	140	Supply Statistics	300
Books	179	Refining Statistics	301
		Demand Statistics	302
		Monthly Statistics	303
		Classified Advertising	304
		Advertisers' Index	309

TECHNICAL FEATURES

Engineering Reference Section	201-209
Foreman's Page	201
Equipment Design and Operation	203
Questions on Technology	209



Good fit for better performance

Yes, from the broad line of Fairbanks-Morse "ZC" Engines, you can *fit* the engine to the pumping unit. No need to overpower and waste money . . . no need to underpower and take the chance of breakdown. From 3 to 30 hp. there's a "ZC" that will ideally answer your requirements.

All "ZC" sizes are high displacement, heavy-duty slow speed models. Horsepower is rated for continuous service. They are all single cylinder types . . . economical to maintain without shop servicing. Simply and ruggedly designed, there are no complicated parts and delicate adjustments. And all engines have the famous extra-heavy, double flywheels which assure symmetry and perfect balance, poised or rolling. Power take-off on either side of the engine . . . there's always one flywheel between load and engine.

See your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL & GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Mud pump hose tough all over; tube would outwear steel

COVER, tube, reinforcements—all have been improved by B. F. Goodrich to build a mud pump suction hose to take more rough wear than any hose you've ever used.

Smooth, tough tube—B. F. Goodrich mud pump suction hose has an oil-proof tube especially developed by B. F. Goodrich to give high abrasion resistance. It's so tough it actually outwears steel in many applications. Tube is smooth so mud flows through at high speed.

Roughneck cover—It's practically abrasion-proof. Move it from job to job, drag it into position, load it into a truck—but be sure it's B. F. Goodrich hose with its extra-tough cover for extra-hard service.

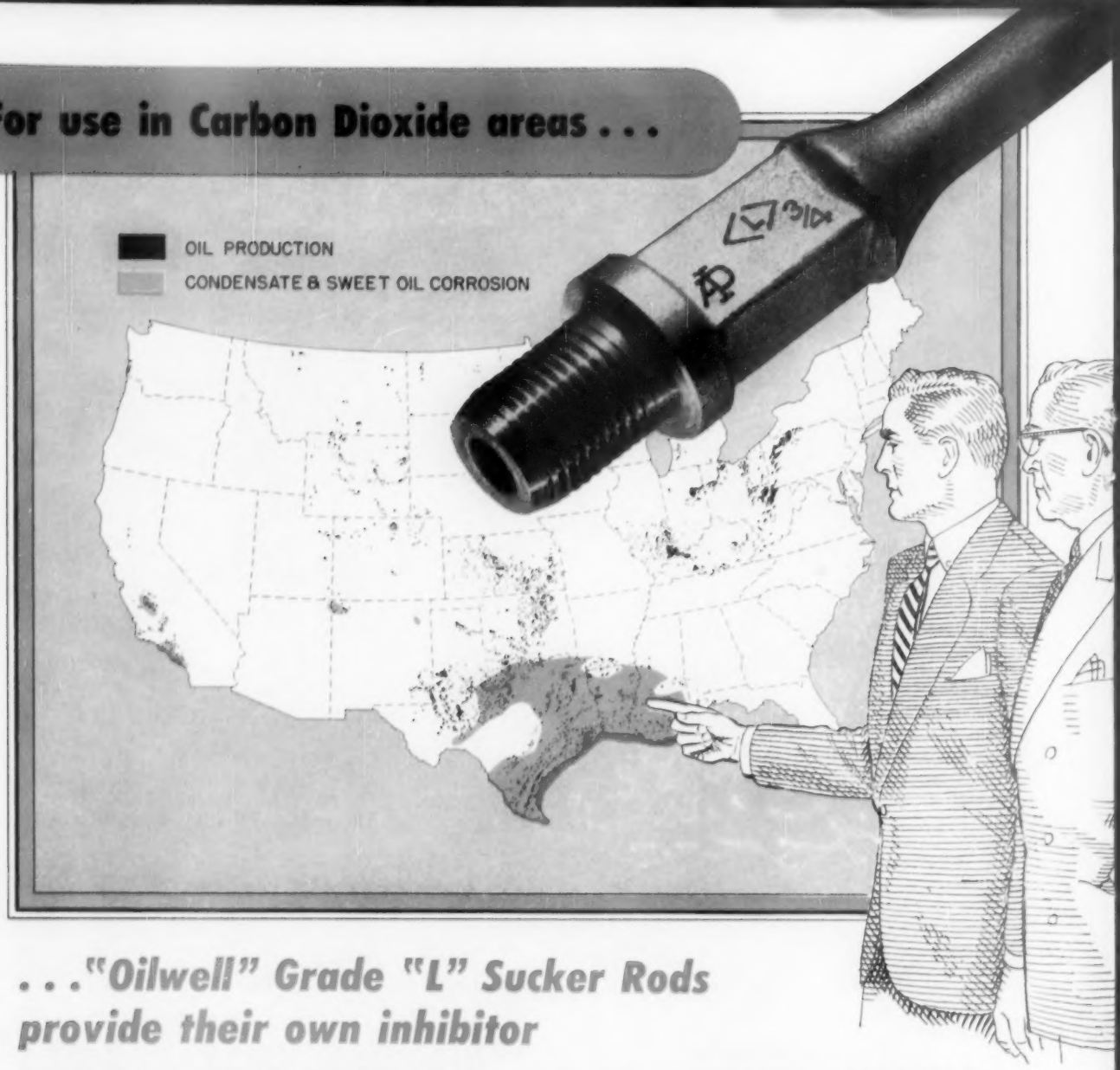
Takes your highest vacuum—B. F. Goodrich mud pump hose will take the highest vacuum pressures used in mud pump work. Heavy spring steel wire spiral-wrapped and imbedded in rubber prevents collapse, keeps rig drilling without costly repairs.

Cords cushioned in rubber—This hose is reinforced with four to six plies of cord—held together and cushioned by rubber that surrounds each individual cord. No cross threads. Hose is more flexible to help dampen vibration, yet stronger to resist crushing and kinking.

Should your local supplier be temporarily out of stock when you call, you can get B. F. Goodrich mud pump hose any time—day or night—from one of these B. F. Goodrich warehouses: Dallas, Hobbs, Houston, Odessa, Wichita Falls, Great Bend, Oklahoma City, New Orleans, Tulsa, Williston, and Los Angeles. *The B. F. Goodrich Company, Dept. M-511, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

For use in Carbon Dioxide areas . . .



. . . "Oilwell" Grade "L" Sucker Rods provide their own inhibitor

THIS MAP is from the National Association of Corrosion Engineers' special symposium on combatting corrosion, reported in the February 15, 1954 issue of The Oil and Gas Journal. Note the areas in which CONDENSATE CORROSION and SWEET OIL CORROSION are associated with oil production. Hydrogen sulphide areas are not shown.

If you have production in these CO_2 "ringworm" corrosion areas, we urge you to use "Oilwell" Grade "L" Sucker Rods for your next string. These rods were first introduced in 1940 and proved an immediate solution to this problem. They sell at a surprisingly low price and hundreds of thousands of feet are performing with remarkable success throughout the indicated areas. In corrosion-free localities, they also have extremely long fatigue-life.

These rods are built to counteract the specific action of carbon dioxide corrosion . . . from laboratory-controlled alloy steel that is high in nickel and chrome.

A thin natural coating forms quickly on the rod surfaces. The unique grain structure, achieved through full normalizing and tempering, causes this coating to cling to submerged rod surfaces and inhibit further corrosive action.

ASK for a free copy of our Sucker Rod Comparison Chart and let an "Oilwell" Production Specialist show you why Grade "L" rods are your best buy in combatting "ringworm" corrosion. Adequate stocks are available for prompt delivery throughout the areas shown.

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices — CALGARY, CANADA
CASPER, WYOMING . . . COLUMBUS, O.
DALLAS, TEXAS . . . HOUSTON, TEXAS
TULSA, OKLA. . . . LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL"

TRADE MARK

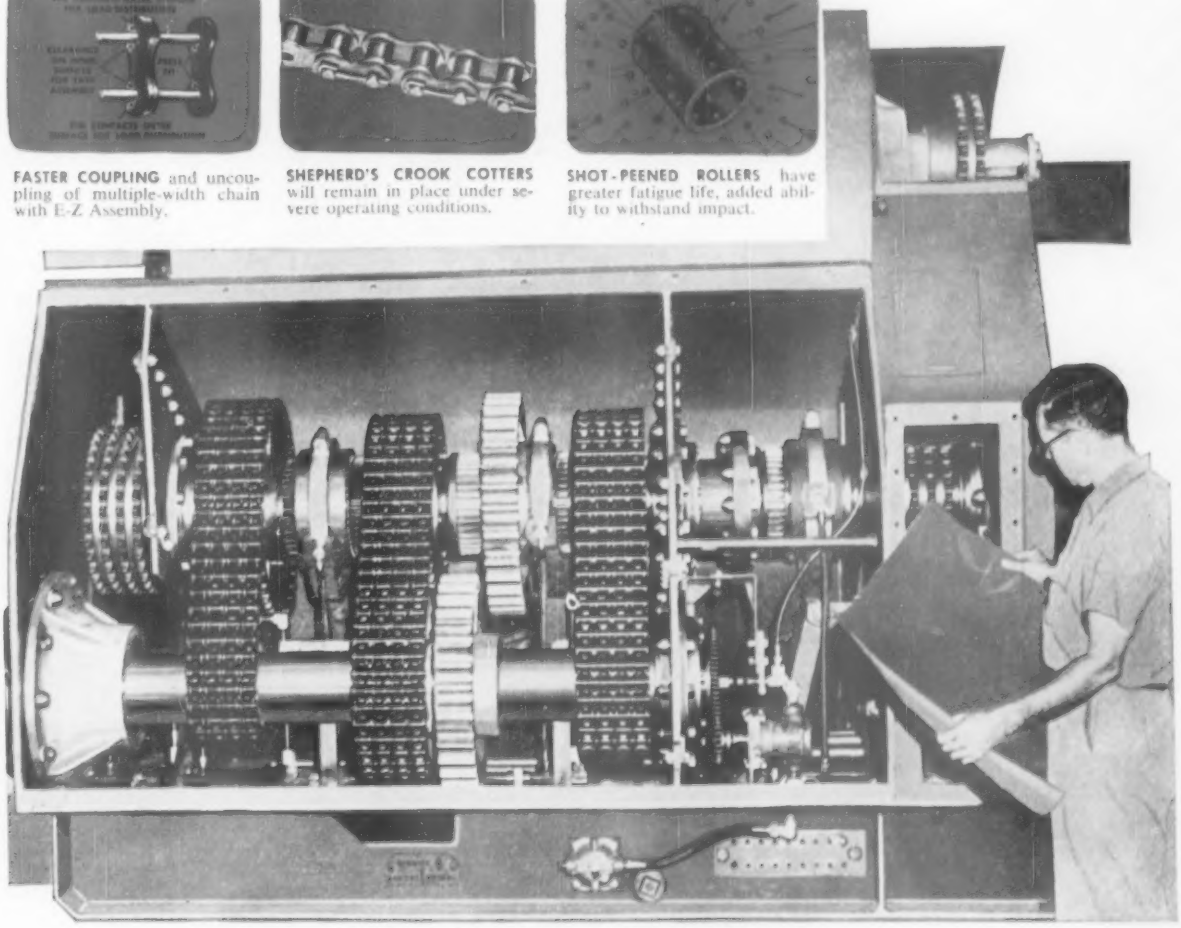
UNITED STATES STEEL

Good equipment deserves these ROLLER CHAIN EXTRAS

FASTER COUPLING and uncoupling of multiple-width chain with E-Z Assembly.

SHEPHERD'S CROOK COTTERS will remain in place under severe operating conditions.

SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.



New Ideco Super 7-11 three-speed transmission equipped with Link-Belt Precision Steel Roller Chain.

You get them all in LINK-BELT Precision Steel Roller Chain

THE high speeds and high efficiency built into today's top drilling rigs demand chain that can keep pace with their performance. That's why you'll find Link-Belt Roller Chain a consistent choice.

This drive is manufactured for long life and low maintenance. Among its vital extras are prestressed multiple widths for uniform load distribution . . . closer heat-treat control . . . rigid testing to assure utmost uniformity.

Even with multiple widths, coupling and uncoupling are simplified by the original E-Z assembly feature . . . and there's no sacrifice of load distribution. These and other Link-Belt features mean reduced downtime and worthwhile savings.

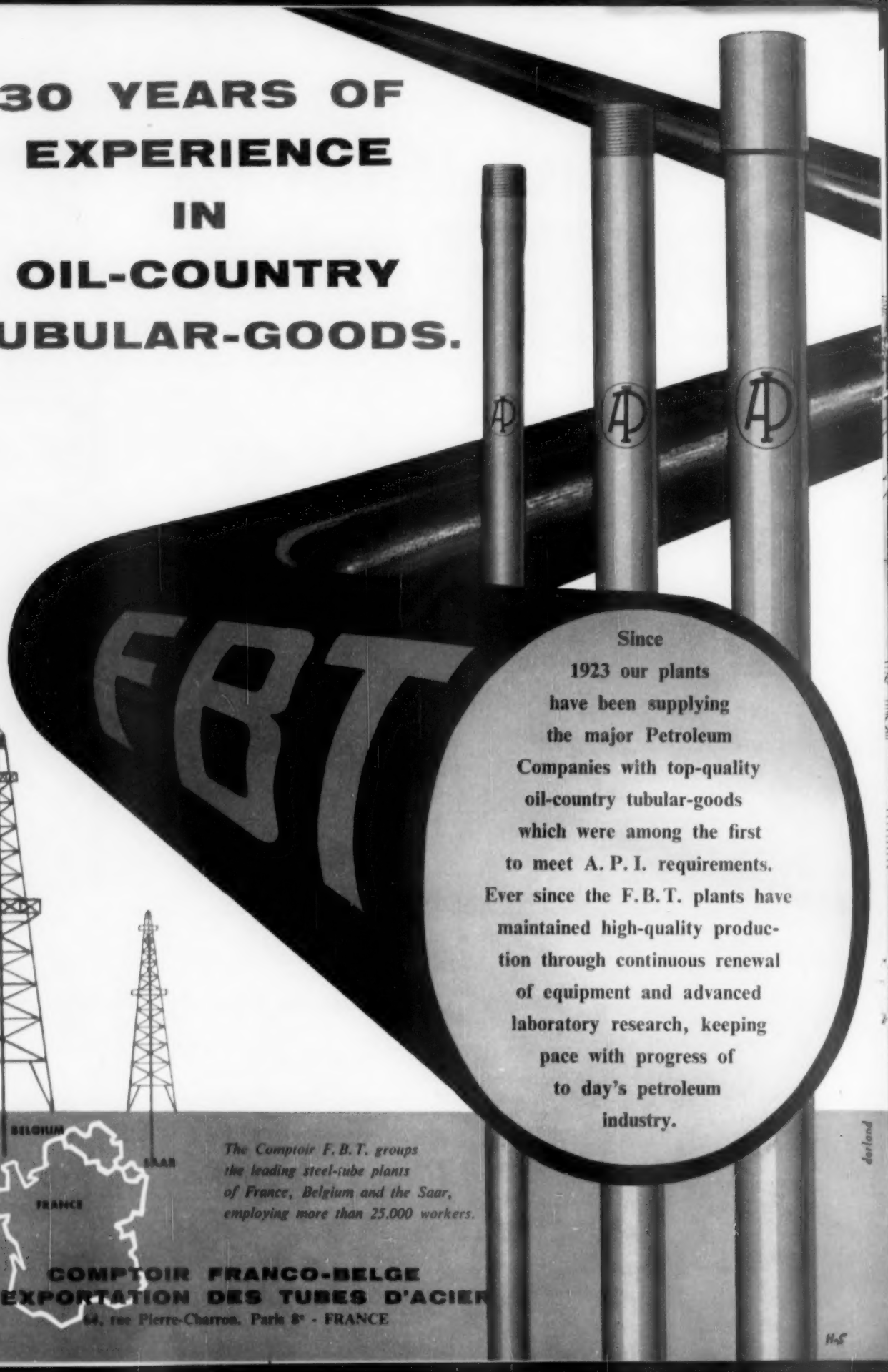
Always specify Link-Belt Precision Steel Roller Chain whether in single or multiple widths. Your source: the nearest Link-Belt office or any leading supply store in the field.

LINK-BELT

ROLLER CHAIN AND SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields

30 YEARS OF EXPERIENCE IN OIL-COUNTRY TUBULAR-GOODS.



Since 1923 our plants have been supplying the major Petroleum Companies with top-quality oil-country tubular-goods which were among the first to meet A. P. I. requirements. Ever since the F.B.T. plants have maintained high-quality production through continuous renewal of equipment and advanced laboratory research, keeping pace with progress of to day's petroleum industry.

The Comptoir F. B. T. groups the leading steel-tube plants of France, Belgium and the Saar, employing more than 25.000 workers.

COMPTOIR FRANCO-BELGE D'EXPORTATION DES TUBES D'ACIER

64, rue Pierre-Charron. Paris 8e - FRANCE

JONES
SUCKER RODS
last longer!

Want to cut pumping costs? Deep wells and heavy loads demand a properly designed sucker rod string of a select steel. Our experienced engineers will gladly help you design such a string—resulting in increased production and lower lifting costs.

LOOK FOR THE GREEN RODS

PESA
PARTNERS IN PETROLEUM PROGRESS

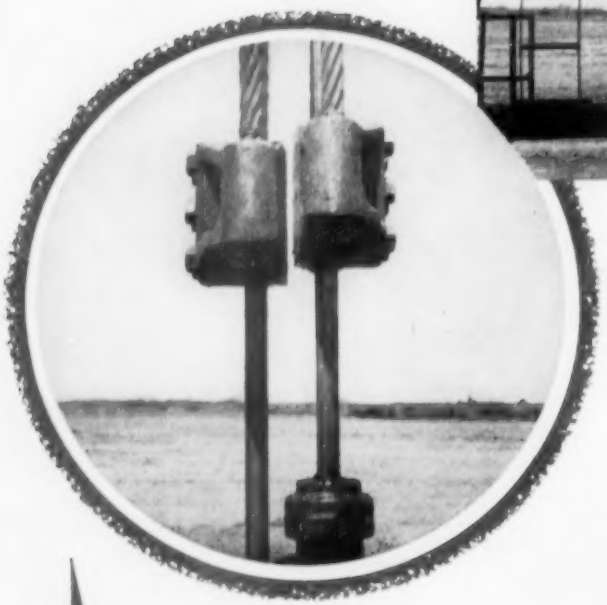
THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation

General Office and Factory: **TOLEDO, OHIO** • Sales Office: Kennedy Building, **TULSA, OKLAHOMA**

Export Sales Representatives: IDECO—Division of Dresser Equipment Company, Republic National Bank Building, Dallas, Texas and Chanin Building, New York City.

two LUFKINS get their HEADS together

to solve another "Knotty" dual completion pumping problem



New LUFKIN "Flush Type" hanger bar with built-in polished rod clamp makes possible the operation of two strings on as close as 3¾ inch centers.

◀ TWO ZONES PRODUCED INDEPENDENTLY IN ONE WELL BY THE USE OF TWO PUMPS WITH SEPARATE STRINGS OF TUBING AND RODS.

Lufkin **FOUNDRY & MACHINE COMPANY**

LUFKIN, TEXAS

Branch Sales and Service: Houston • Dallas • New York • Tulsa • Los Angeles • Seminole • Oklahoma City • Corpus Christi • Odessa Kilgore • Wichita Falls • Casper, Wyoming • Great Bend, Kansas • Effingham, Illinois • Sterling, Colorado Lafayette, Louisiana • Bakersfield, California • El Dorado, Arkansas

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, EDMONTON, ALBERTA, CANADA

Day after day, TIMKEN® bearings take heavy loads on Lufkin pumping units

LUFKIN Foundry and Machine Company builds pumping units like the one below with the knowledge that they must lead a long and rugged life of virtually unattended operation. They pump crude oil out of the ground in great quantity day after day, and they must be able to take the heavy pounding encountered in sanded-in wells. To help make this possible and with minimum maintenance, Lufkin mounts the crank pins of the larger units on Timken® tapered roller bearings.

The tapered design of Timken bearings enables them to take the heavy radial and thrust loads encountered. And full line contact of rollers and races in Timken bearings gives them the extra load-carrying capacity they need in rugged oil field work. Timken bearing rollers and races are case-carburized to give them a hard, wear-resistant surface over a tough, shock-resistant core.

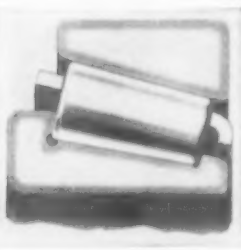
And we make our own steel to insure bearing quality. No other American bearing maker does. And we make it nickel-rich for superior toughness.

By holding the pitman boxes concentric with the pins on these pumping units, Timken bearings make seals more effective in keeping lubricant in, dirt out. Maintenance costs are reduced, wear is cut down.

Get the No. 1 bearing value by specifying Timken bearings on all the oil field equipment you build or buy. Look for the trade-mark "Timken" on every bearing. It's your assurance of trouble-free service. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

HOW LUFKIN FOUNDRY AND MACHINE COMPANY MOUNTS Timken tapered roller bearings on the pitman pins to carry heavy radial and thrust loads, insure long life, less maintenance.



HARD ON THE OUTSIDE, TOUGH ON THE INSIDE

Rollers and races of Timken bearings are case-carburized to give a hard, wear-resisting surface over a tough, shock-resisting core. Result: longer bearing life.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. nickel-rich Timken alloy steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

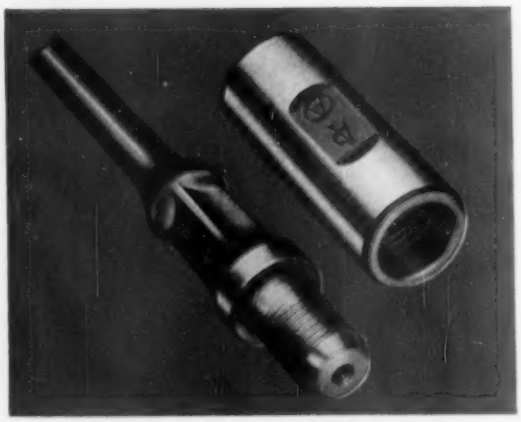
NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ⟊ AND THRUST ⟊ LOADS OR ANY COMBINATION ⟊

This is trouble...

Trying to increase barrels per day by the trial and error method of rod string selection is a sure-fire way of tossing money down the hole. Pictured is a sucker rod and coupling from a Southern California field. Incorrect specification of size or combination of sizes, improper choice of the type of rod for the well condition caused the failure.

This is trouble-free...

Here's why ..... The wise operator calls in an Axelson field expert who analyzes the well condition. This assures the proper recommendation of both type and size of rods. Add to this the 63 year experience of Axelson in manufacturing petroleum pumping equipment and you have the reason why there are so many remarkable Axelson performance stories.



To be SURE, call an Axelson field expert

AXELSON

Sucker Rods and Couplings

Write for Bulletin No. 5306

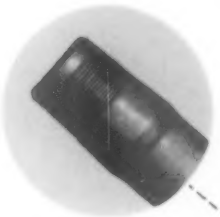
AXELSON MANUFACTURING COMPANY • DIVISION OF U. S. INDUSTRIES, INC. • LOS ANGELES 58, NEW YORK 7, TULSA 1, ST. LOUIS 16

GENERAL OFFICES: P.O. BOX 58335 VERNON STATION, LOS ANGELES 58

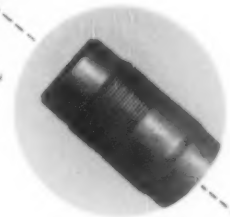
DISTRIBUTORS—Jones & Laughlin Steel Corp., Supply Division; Great Northern Tool & Supply Company; Jones & Laughlin Steel Sales Co., Ltd., Supply Division, Edmonton, Alberta, Canada; Dominion Oilfields Supply Co., Ltd., Calgary, Alberta, Canada; Adrian Bolland & Cia., S.R.L., Buenos Aires, Argentina, S.A.; Gross Equipment S.A., Lima, Peru, S.A.; Industrial Agencies Ltd., San Fernando, Trinidad, B.W.I.; MAQUIP (Comercial de Marquinas e Equipamentos) S.A., Rio De Janeiro, Brazil, S.A.; Servicios Industriales, C.A., Barcelona, Venezuela, S. A.; Servicios Industriales, C.A., Maracaibo, Venezuela, S.A.; Wells Fargo & Co. Express, S.A., Mexico, D.F.; Del Prado & Compania, Ltda., La Paz, Bolivia.

YOUNGSTOWN DRILL PIPE

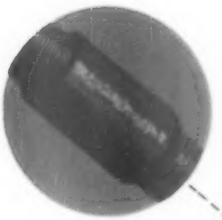
a type for a full line of tool joints



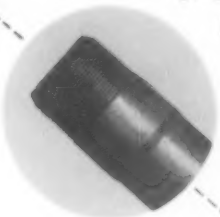
Super Shrink Grip



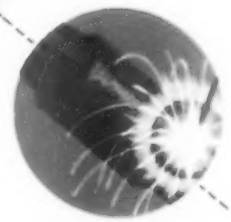
Straight Grip



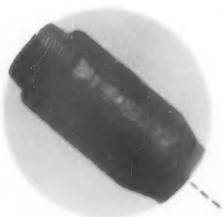
Standard API



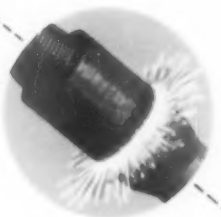
Seal Grip



Counter-bore Weld



An Integral Joint . . .



. . . by Flashweld

Replaceable . . . Flashweld . . . old-time counter-bore. You name it, we've got it! The Continental Supply Company has Youngstown Drill Pipe with a wide variety of ends finished to accommodate a full line of tool joints, in grades to meet requirements of deepest drilling.

QUALITY YOUNGSTOWN SERVICE

THE CONTINENTAL SUPPLY COMPANY

General Offices: DALLAS, TEXAS

Representatives in All Principal Oil Fields of the World

CONTINENTAL

Serving the Oil and Gas Industries

ALL ROADS LEAD TO CONTINENTAL FOR QUALITY AND SERVICE

Continental's well-stocked Stores . . . conveniently located throughout the Oil Country . . . provide quality equipment and dependable, time-saving service.

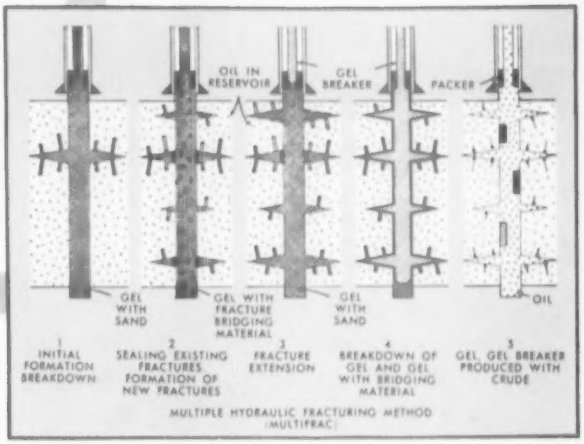
THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
Representatives in All Principal Oil Fields of the World

CONTINENTAL
Serving the Oil and Gas Industries

MULTIPLY OIL DRAINAGE

BY

MULTIPLE FORMATION FRACTURES


OIL IN RESERVOIR
GEL BREAKER
PACKER
GEL WITH SAND
GEL WITH FRACTURE BRIDGING MATERIAL
GEL WITH SAND
OIL
1 INITIAL FORMATION BREAKDOWN
2 SEALING EXISTING FRACTURES FORMATION OF NEW FRACTURES
3 FRACTURE EXTENSION
4 BREAKDOWN OF GEL AND GEL WITH BRIDGING MATERIAL
5 GEL, GEL BREAKER PRODUCED WITH CRUDE
MULTIPLE HYDRAULIC FRACTURING METHOD (MULTIFRAC)

HALLIBURTON'S MULTIFRAC

Oil drainage to the well bore is materially assisted by Halliburton's Multifrac. A whole series of formation fractures can be produced in one consecutive operation.

Multifrac is a combination of single fractures – created by various fracturing fluids – and a temporary plugging material. It is particularly applicable in open holes where the use of packers is impractical. In this process a single fracture is first made in the productive zone. The fracture created is then plugged with a granular type bridging additive carried in a viscous fluid. This is followed with the sand carrier fluid under increased pressure causing another fracture. Thus by alternating the two mixtures, one with bridging additive and one without, fractures can be made, extended and sealed off in rotation in one consecutive operation. The bridging additive dissolves in the formation oil so that the plugging is only temporary.

Secure the maximum oil drainage possible for sustained production with Halliburton's Multifrac. Call your local or district office of the Halliburton Oil Well Cementing Company.

COMPLETE DATA
SENT ON REQUEST

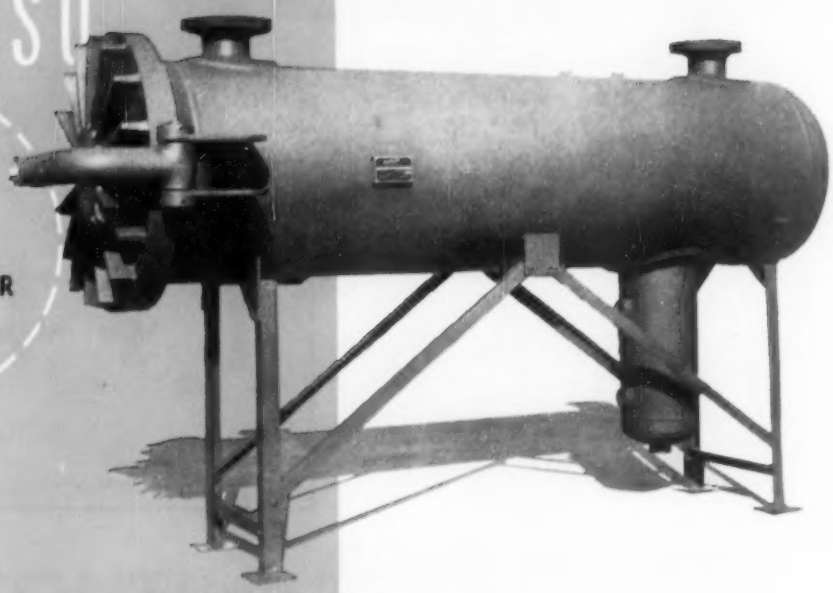
Add this valuable information to your Halliburton Service File.

HALLIBURTON FRACTURING SERVICES

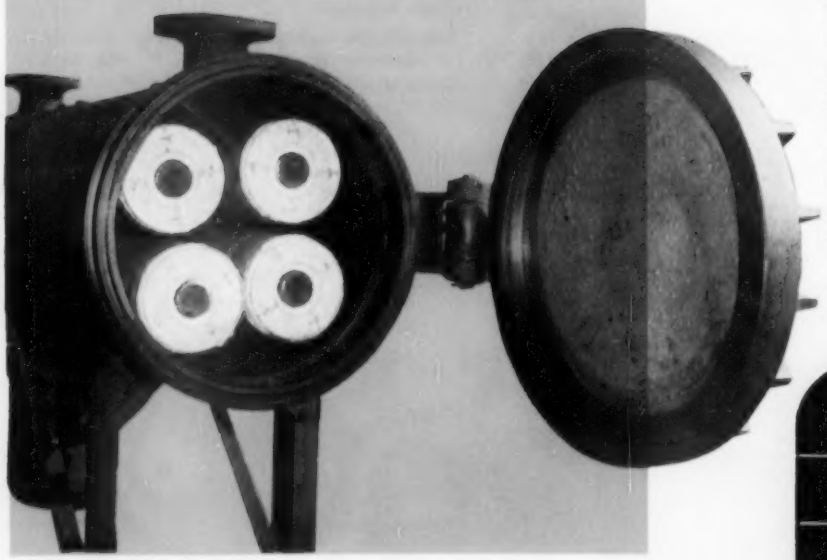
250 SERVICE CENTERS – JUST MINUTES AWAY FROM ANY RIG

EXCEL-SO

HP-700
CLUSTER
REPACK
SEPARATOR
STRAINER



. . . the only high volume pipeline strainer that removes free water from petroleum products!



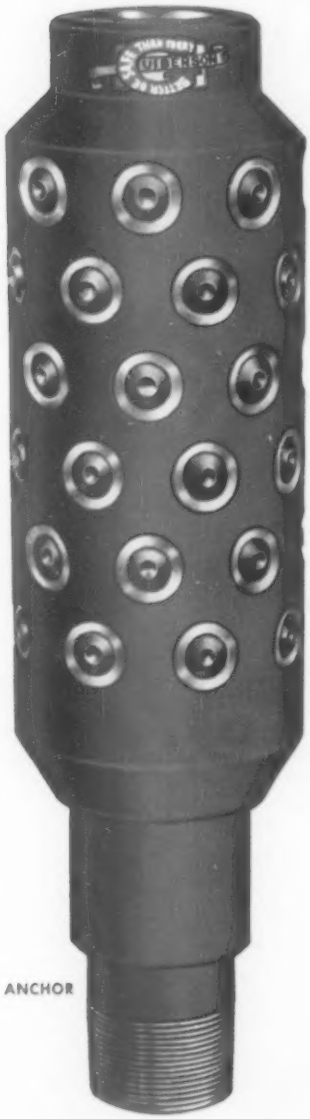
The HP-700 is rated from 750 to 1000 GPM on gasoline and fuel oil. The four repack cartridges provide a total filtering area of approximately 5,500 square inches. This Separator-Filter effectively removes solid particles down to forty microns in size. Equipped with quick opening closures and other easy service features, this compact unit is designed especially for the pipeline industry. Write for detailed information.

WARNER LEWIS COMPANY

BOX 3096 • TULSA, OKLAHOMA

DIVISION OF **FRAM** CORPORATION

GUIBERSON'S IMPROVED TYPE H1 ANCHOR features GREATLY REDUCED SLIP WEAR



TYPE H1 ANCHOR

Here is the anchor most widely used by oilmen everywhere — now, with a great new feature. Stainless snap rings hold the slips in retracted position while going in yet have no effect on holding power of the anchor. This new feature gives far longer slip life because slips do not drag the casing wall. Slips with the snap ring are interchangeable on all Guiberson H1 anchors.

There is nothing on the market that will excel Guiberson's Type H1 Hydraulic Anchor for holding down any packer. It *automatically* sets when pressure in tubing overcomes casing pressure. We recommend it for holding down your packer in acidizing, fracturing or other below packer pressuring operations. It holds equally well in any direction.

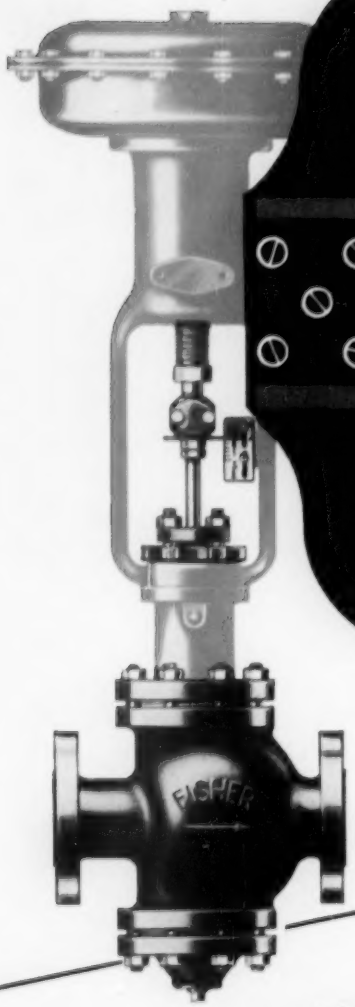
Simplicity of design and completely automatic operation make the H1 exceedingly easy-running, easy-pulling. Case hardened piston slips in monel inserts assure positive action and maximum corrosion resistance. H1 anchors are individually tested and will hold any pressure the tubing will stand.

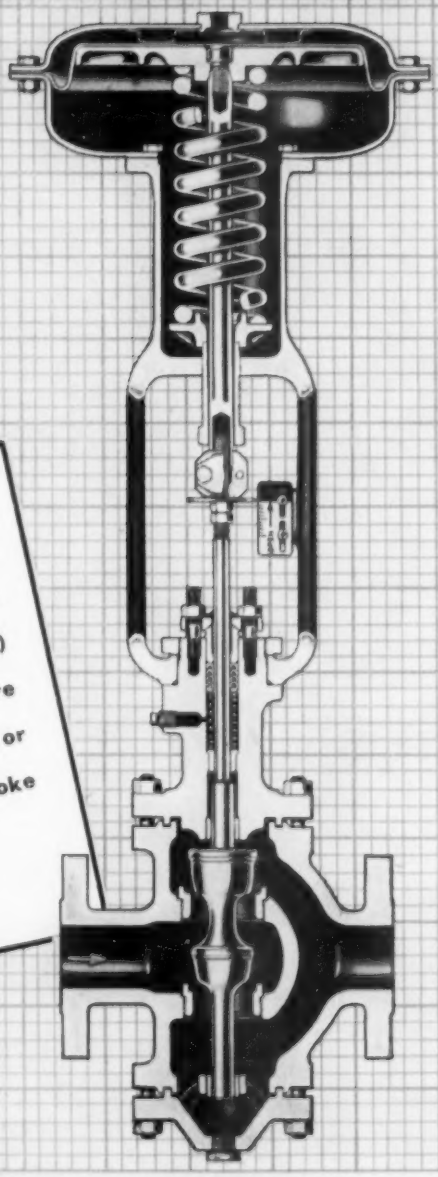
See this improved Type H1 Anchor for yourself. Use it on your next completion or workover. Write for data, sizes and prices.

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

FISHER®

DIAPHRAGM





● Fisher Diaphragm Motor Valves are furnished in a wide variety of pressure ratings and materials. Topworks may be either direct acting (Series 657) or reverse acting (Series 667). Handjacks are available for either diaphragm casing mounting or yoke mounting. There are six diaphragm and yoke size combinations.

Improved

MOTOR VALVES

Improved PERFORMANCE FEATURES

- Bolted-clamp type stem connection allows stem adjustment of 50% of total travel. Can be disconnected in the field without stem damage. Will not shake loose from vibration or rotational inner valve forces.

- Rugged body to yoke connection with hammer lug nut. Topwork can be removed without disturbing stuffing box.

- Specially designed Buna N molded diaphragms with Nylon insert retain superior flexibility at low ambient operating temperatures. Provides linearity between operating pressure signal and travel, and gives maximum effective area.

- Bolted gland stuffing box with Teflon packing.

- Stainless steel clear view travel indicator.

- Spring ranges: 3 to 15 psi; 6 to 30 psi.

FISHER GOVERNOR COMPANY • Marshalltown, Iowa

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

FISHER

Our 75th ANNIVERSARY

what is the gauge of steel plate quality?

The quality of any product is hard to gauge exactly. Two of the most accurate gauges of steel plate quality are, first, the degree of control exercised over its production—during *every* step from iron ore to finished plate—and, second, its acceptance by fabricators and users.

When you order Claymont Carbon and Alloy Steel Plates—including Abrasion-Resistant and Low Alloy High Strength Steel Plates—you are assured of top quality . . . because each step is conducted in CF&I's own blast furnaces, open hearths and rolling mills, following the most rigid control and testing standards. Throughout the operation, the steel is constantly tested by our metallurgists to assure proper physical and chemical properties, to meet the exact requirements of *your* job.

But in the final analysis, the proof of product quality is always in its use. Claymont plates are being ordered by fabricators everywhere for a wide variety of uses, because they have proved their high quality time after time. You can order them in standard ASTM and AISI specifications, as well as special plates for special applications. To get full details, contact our nearest sales office or write to Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Del.

CF&I **Claymont Steel Products**

3538

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

Abilene • Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Casper • Chicago • Denver • Detroit • El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Los Angeles New Orleans • New York • Oakland • Odessa • Oklahoma City • Philadelphia • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • Seattle • Spokane • Tulsa • Wichita

CANADIAN REPRESENTATIVES AT: Edmonton • Toronto • Vancouver • Winnipeg

OTHER CLAYMONT PRODUCTS

Stainless-Clad Plates • Flanged and Dished Heads • Manhole Fittings and Covers • Large Diameter Welded Steel Pipe • Flame Cut Steel Plate Shapes • Lectro-Clad Nickel Plated Steel

UNDERCOVER AGENTS AT WORK

Dependable protection against underground corrosion is one of the most essential considerations in the installation of any pipeline. This protection usually consists of an insulating, corrosion-inhibiting coating applied to the pipe surface, with further shielding provided by a wrapper to resist abrasion and soil stress. These are the "undercover agents" that safeguard pipeline installations against corrosion leaks and deterioration.

Throughout the nation today, leading utilities and pipeline companies look to Dearborn for long-term protection of one of their most important investments—the carrier pipe that must transmit material thousands of miles to its consumer. Dearborn's NO-OX-ID Coatings and NO-OX-IDized Wrappers provide chemical and mechanical protection against moisture penetration and soil action—protection that lasts for decades—on installations under ground or under water.

Whether applied by hand . . . by Traveliner . . . or at the mill, Dearborn Coating Combinations are your best assurance of dependable, long-life protection. On your next pipe-coating job, you'll find it pays to specify Dearborn NO-OX-ID.

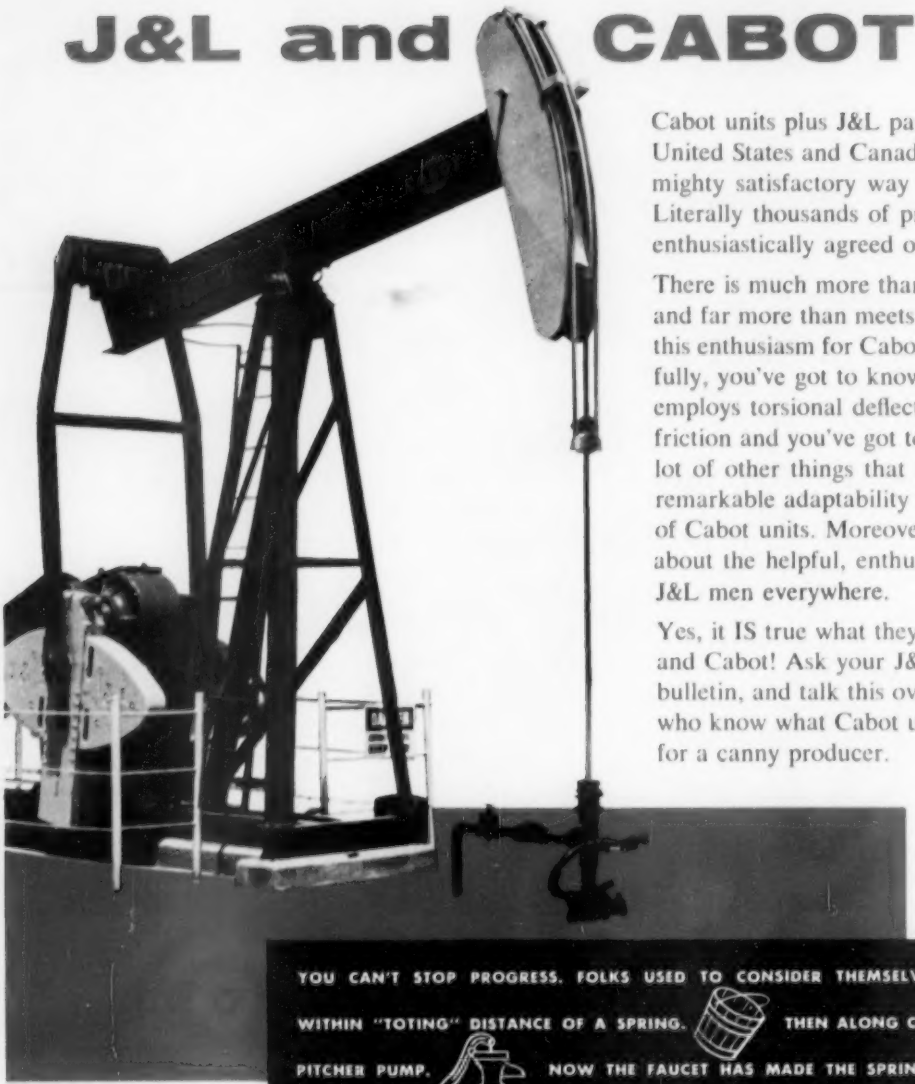
Dearborn NO-OX-ID®

For Long-Term Pipeline Protection

DEARBORN CHEMICAL COMPANY
Merchandise Mart Plaza, Dept. OG, Chicago 54, Ill.
Please send me complete information about NO-OX-ID.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*.....*State*.....

Is it true what they say about J&L and CABOT



Cabot units plus J&L parts service in the United States and Canada add up to a mighty satisfactory way to pump a well. Literally thousands of producers are enthusiastically agreed on this.

There is much more than pride of ownership and far more than meets the casual eye in this enthusiasm for Cabot units. To understand fully, you've got to know how Cabot employs torsional deflection to eliminate friction and you've got to know about a lot of other things that contribute to the remarkable adaptability and endurance of Cabot units. Moreover, you've got to know about the helpful, enthusiastic attitude of J&L men everywhere.

Yes, it IS true what they say about J&L and Cabot! Ask your J&L store for a Cabot bulletin, and talk this over with J&L men who know what Cabot units can do for a canny producer.

YOU CAN'T STOP PROGRESS. FOLKS USED TO CONSIDER THEMSELVES LUCKY WHO LIVED WITHIN "TOTING" DISTANCE OF A SPRING. THEN ALONG CAME THE WELL AND THE PITCHER PUMP. NOW THE FAUCET HAS MADE THE SPRING AND THE WELL SEEM OBSOLETE . . . JUST A "TWIST OF THE WRIST" AND WATER FLOWS FREELY!

J&L STEEL

Cabot Pumping Units are as automatic as the modern water faucet and require just about as much attention. *Less* than a twist of the wrist starts your Century Motor and Cabot does the rest.

133-M

Jones & Laughlin STEEL CORPORATION

SUPPLY DIVISION – Tulsa

SERVING THE UNITED STATES AND CANADA

BEAIRD-INGERSOLL-RAND

Packaged Compressor Plant

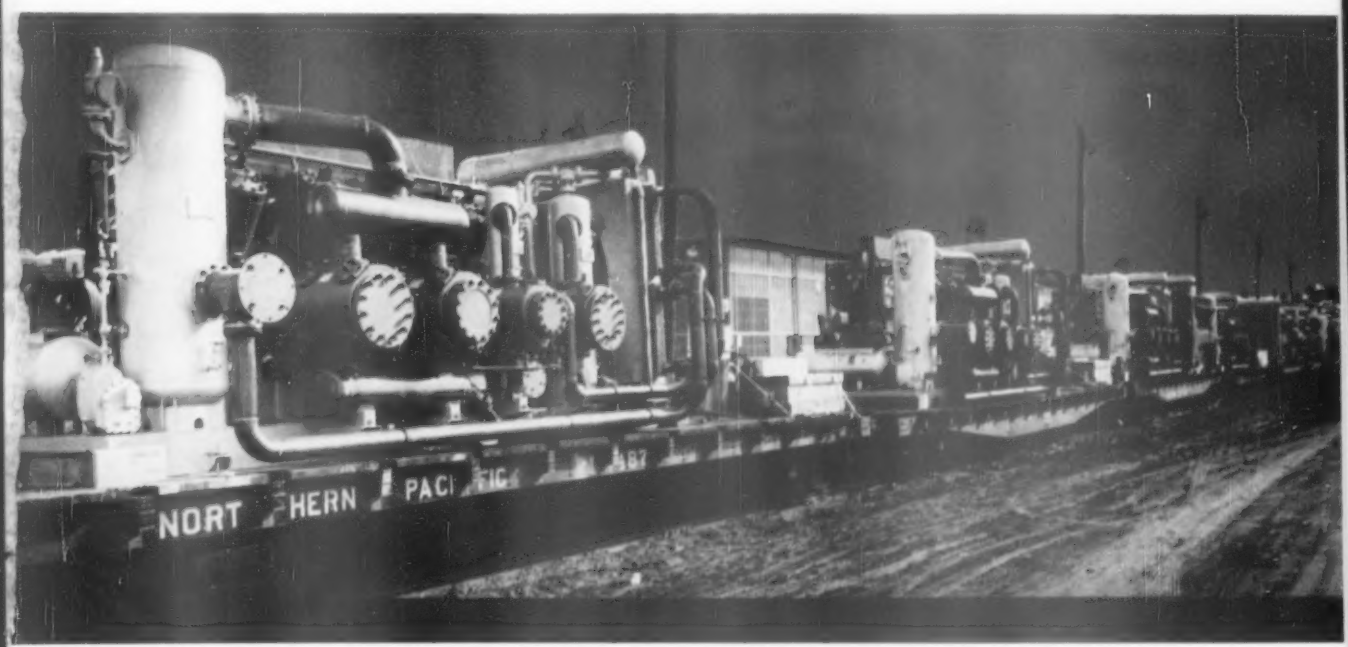
Lowest Cost Per Horsepower Installed

ARTHUR G. McKEE AND COMPANY used this train load of Beaird-Ingersoll-Rand 8SVG packaged compressors for gas boosting service when they engineered Petroleo Mexicanos gas gathering system at Poza Rica. Located in the hot humid coastal plains of Mexico, the Poza Rica project presented many unusual operating problems: the wells to be produced were scattered over outlying, relatively unimproved areas: variations in wellhead pressures ranged from atmosphere to over 250 psig; the gas contained a high percentage of corrosive hydrogen sulfide; and leakage of air into the gas had to be avoided as it would seriously affect later processing.

Working as a team with McKee personnel, Beaird gas engineers met these critical production conditions with this group of specially designed packaged compressors. To eliminate the need for resident operators, the units were fitted with automatic controls that permit their unattended operation. Matching compression output requirements with wellhead pressures enabled all units to feed into the gathering line at equal pressures. Engine radiators, compressor fittings and scrubber elements were built from non-corrosive metals. Special gas filled stuffing boxes were designed and installed on compression cylinders, eliminating any possibility of air leakage.

Arthur G. McKee and Co. Install –

TEN PACKAGED COMPRESSORS IN PLANTS BUILT FOR PEMEX POZA RICA FIELDS



Train load of 10 Beaird-Ingersoll-Rand 8SVG 440 h.p. four cycle gas engine driven compressors enroute to Pemex Poza Rica fields. Units are equipped with Young radiators and all necessary equipment and controls. Other sizes 110 to 660 h.p.

Shipped completely assembled to location, the compressors required a minimum of time and materials for their installation. And, at a later date, they will be moved to other service as complete units, salvaging nearly all of the present installation.

Let us help you with your compression problems. Our gas engineers have years of experience in designing equipment that will handle even the most unusual conditions . . . economically. Write today.

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

MACHINING • MANUFACTURING • STEEL WAREHOUSE

"This time I'm running a **MARTIN"**

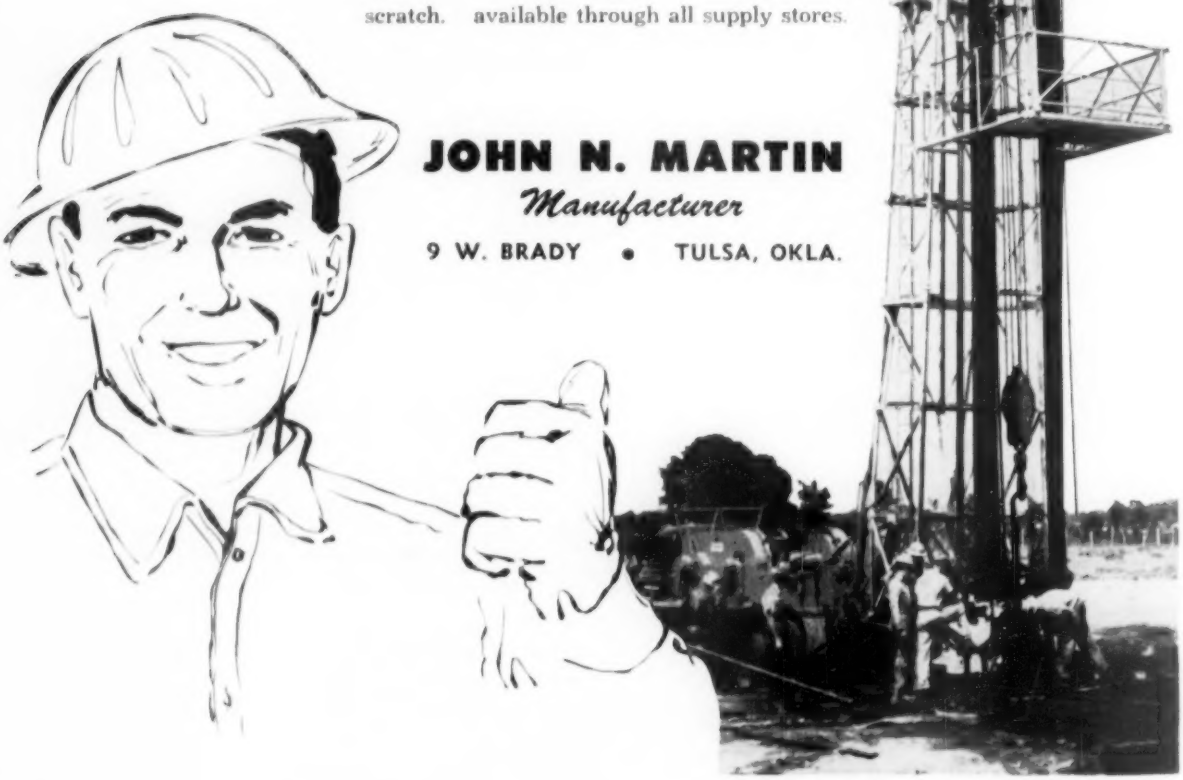
MARTIN PLUNGERS & CAGES

Martin Plungers are especially good where sand or salt water conditions occur. Water is a lubricant for rubber. And since the Martin Plunger uses numerous split rubber-and-duck rings, the water content of the well actually serves as an efficient lubricant for the Martin Plunger. In sand, Martin Rings form a sand resistant seal without a tight, wearing fit in the working barrel . . . won't score or scratch.

Martin Cages often double ball and seat life. The resilience, resistance to sand abrasion, non-magnetic character and electrical resistance of the rubber guide cause the Martin Cage to perform better and longer than ordinary cages.

There is a Martin Plunger and Cage for your particular installation and conditions. Write for John Martin Catalog No. 4, which gives complete details.

Martin Plungers and Cages are available through all supply stores.



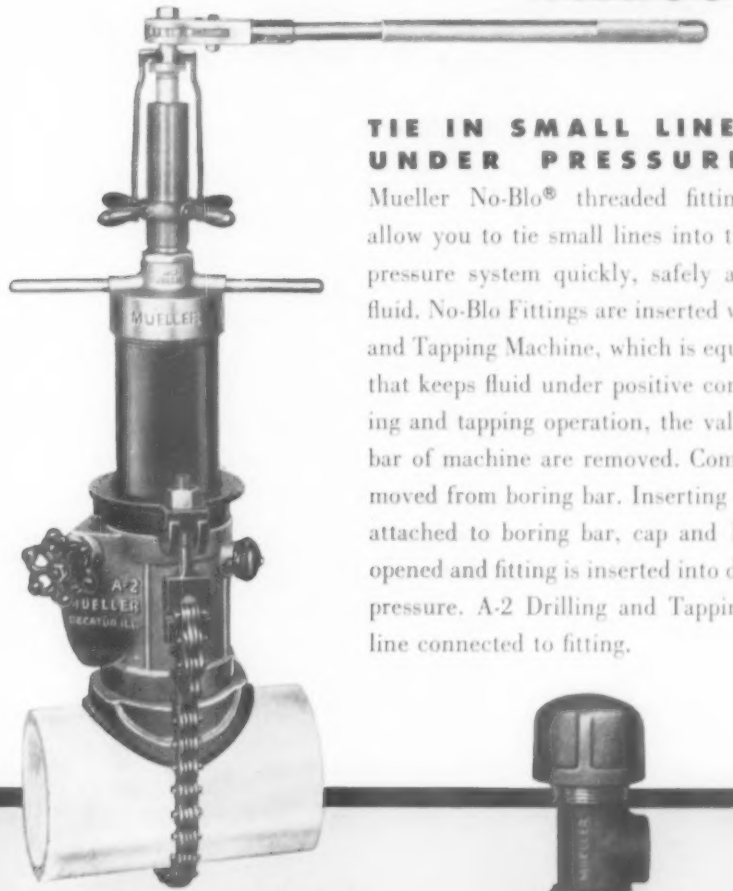
JOHN N. MARTIN

Manufacturer

9 W. BRADY • TULSA, OKLA.

MUELLER

MAKE *Permanent* CONNECTIONS WITHOUT *welding!*



"A-2" Drilling and Tapping Machine.

Pressures to 200 p.s.i. Used to drill and tap lines and install No-Blo Fittings up to 2" under pressure.

TIE IN SMALL LINES UNDER PRESSURE.

NO-BLO®

Mueller No-Blo® threaded fittings allow you to tie small lines into the pressure system quickly, safely and simply, without loss of fluid. No-Blo Fittings are inserted with the Mueller A-2 Drilling and Tapping Machine, which is equipped with an integral valve that keeps fluid under positive control. After completing drilling and tapping operation, the valve is closed, cap and boring bar of machine are removed. Combination drill and tap is removed from boring bar. Inserting tool and No-Blo Fittings are attached to boring bar, cap and bar are remounted, valve is opened and fitting is inserted into drilled and tapped hole under pressure. A-2 Drilling and Tapping Machine is removed and line connected to fitting.

Special Valve Tee.

Used for thin wall or small diameter steel pipe. Inlet threads form a strong mechanical connection to main — Compression joint of steel-encased neoprene is tightened down against pipe to form pressure tight seal. Welding or inside I.P. threaded outlet sizes ¾" and 1".

Service or Valve Tee.

Threaded inlet connection permits quick, easy insertion in steel pipe. Welding, inside or outside I.P. thread outlet in various combinations of sizes up to 2". Service Tee is installed in line with deferred completion stopper in place, or if desired, Valve Tee may be used with integral valve for shut-off.

Consult your Mueller Representative or write direct for complete information.

MUELLER CO.

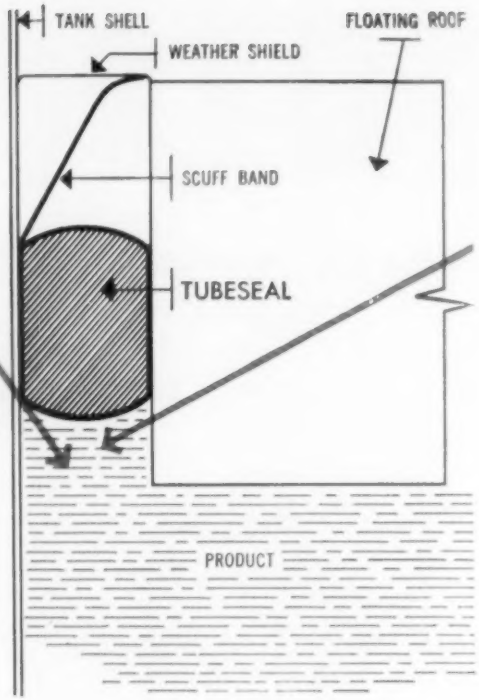
Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

THE SECRET OF A GOOD FLOATING ROOF:

NO ROOM FOR VAPORS*

*NO EVAPORATION
NO FIRES
MINIMUM CORROSION



Because there is no space in a HAMMOND TUBESEAL FLOATING ROOF, where vapor can form, jet fuels and other volatile products can be stored with assurance that evaporation and fires cannot take place and further that corrosion will be kept to a bare minimum.

THE HAMMOND TUBESEAL

The most efficient and positive seal known: no moving parts · no mechanical maintenance · climate proof · non-corrodible · can operate to bottom of tank or above the top · no vapor space below the seal · entire circumference has tight seal under pressure at all times.

LICENSES AVAILABLE

The makers of TUBESEAL believe that its unique safety and economy factors should be allowed to benefit the broadest possible section of the petroleum industry. For that reason HAMMOND IRON WORKS will license its use on a non-exclusive basis. For further information write to:

HAMMOND IRON WORKS,
Warren, Pa.

Sales Offices:
NEW YORK 20
AKRON
BOSTON 10
BUFFALO 2
CHICAGO 3
CINCINNATI 2
CLEVELAND 15
EL PASO
HOUSTON 2
LOS ANGELES 14
PITTSBURGH 19
RICHMOND 20
SAN FRANCISCO
WASHINGTON 6, D.C.
HAVANA
MEXICO CITY
"TIPSA" BUENOS AIRES
Licensee in Cal.:
LACY MFG. CO.,
LOS ANGELES
Licensee in Canada
BRIDGE & TANK CO.

HAMMOND
TUBESEAL*
COSTS NO MORE IN THE FIRST PLACE

* Patent applied for

ask for Bulletin TS

CHEAPER OVER THE YEARS

HAMMOND
IRON WORKS
WARREN and BRISTOL, PA. • PROVO, UTAH
CASPER, WYO. • BIRMINGHAM, ALA.

So Easy to Move... So Smooth in Action

It's new—the Bethlehem S-45-E. But already, field men have learned how simple it is to move, and what a smooth, fast job it does. It's the perfect rig for light rotary, slim-hole drilling and workover chores.

Portable? Yes indeed! Together with the derrick, this sturdy little outfit can easily be mounted on a trailer; easily moved from job to job. With this sort of set-up it stays on the trailer during actual drilling operations.

But portability is only one of its many good points. The unit is rugged, husky in every part, despite its compact dimensions. It has large shafts and bearings, powerful brakes; extra-strong oil-bath chain drives. Moreover, it is equipped with air-friction clutches, a real feature; clutch capacity is higher than generally found in a rig of this size.

Smooth torque-converter drive, which eliminates shock-loading, is standard equipment. Optional items include upper drum and hydromatic brake, which can be installed when the unit is built or later at field location.

For full details of the S-45-E, check with the nearest Bethlehem Supply office. Our engineers will gladly explain its many advanced features, and show you the rig in service at the nearest installation.

Trailer-mounted S-45-E and other Bethlehem drilling equipment at work near Kingston, Miss.

BETHLEHEM S-45-E

BETHLEHEM SUPPLY

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

West Coast Headquarters: Los Angeles, Calif.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York, N. Y.

For wider adaptation . . . and unmatched Service Life . . . . .

Vogt GENERAL GP PURPOSE * DROP FORGED VALV

We invite you to inquire into the savings which the new line of Vogt GP Drop Forged Steel Valves can make possible in your operations. Not only do their many unique and exclusive features make them more economical of operation, but their broad adaptability to so many industrial applications permits a substantial reduction in operating overhead. Service life, too, is enhanced with Stellite faced seating surfaces which are available at no extra cost along with many other trims.

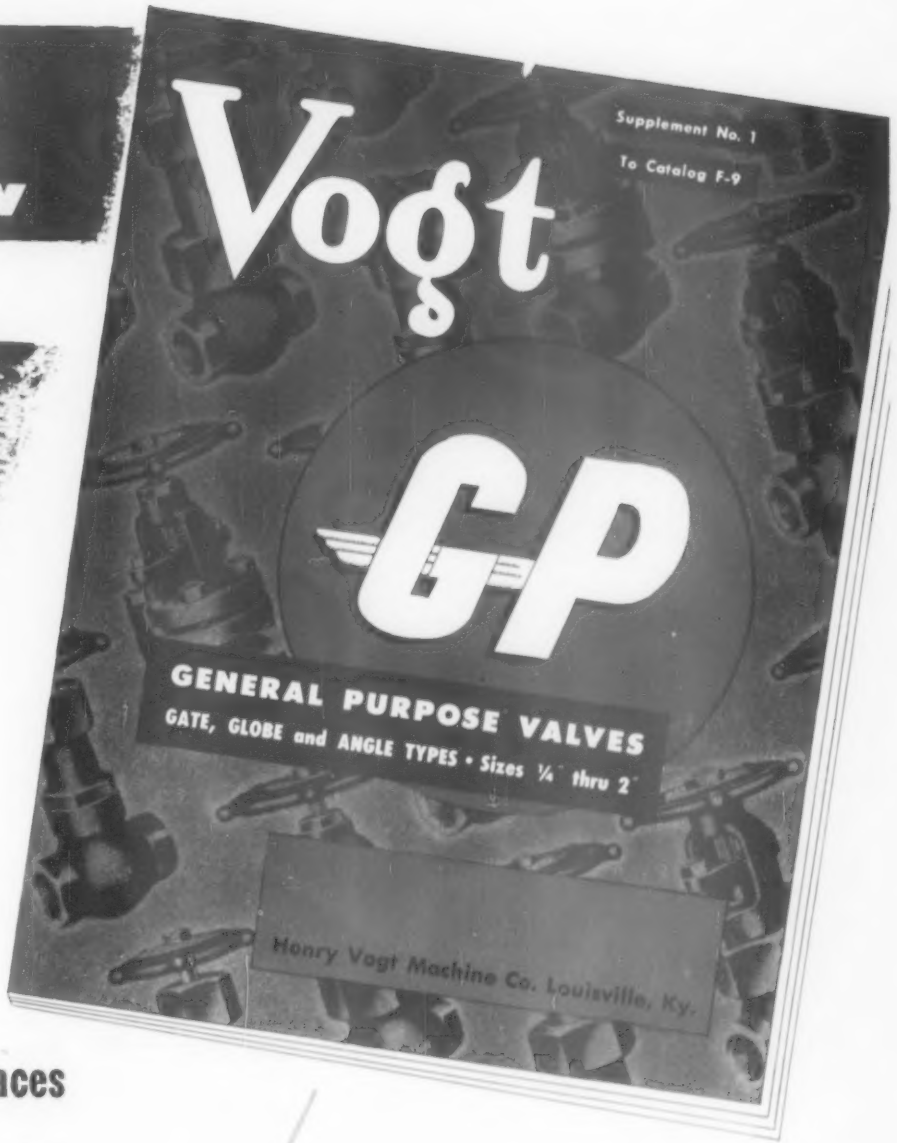
FREE
Supplement No. 1 to Vogt Catalog F-9

* GP Valves completely fill the demands of industry for a line of compact, lighter weight, shorter face-to-face valves.

Still retaining the safety and ruggedness inherent in a wrought material, these new forged steel screw and socket weld end valves, in sizes from ¼" through 2", are rated 800 pounds at 850°F. and 2,000 pounds at 100°F.

the New

STEEL
ES



150-800 Pounds Service
(2000 pounds cold)

•

Featuring Stellite Faced Seating Surfaces

•

Sizes ¼" to 2"

This 32-page catalog illustrates and gives complete specifications on 11 types of the new Vogt GP forged steel gate, globe and angle valves. Send for your free copy—for ready reference in purchasing. Use the coupon for convenience.

HENRY VOGT MACHINE CO.
LOUISVILLE 10, KENTUCKY

SALES OFFICES: New York, Philadelphia, Cleveland, Chicago, St. Louis, Charleston, W. Va., Cincinnati, Dallas, San Francisco

HENRY VOGT MACHINE CO.
LOUISVILLE 10, KY. DEPT. 24-FO

Gentlemen:

Please send copy of New Vogt Catalog Supplement No. 1 to . . .

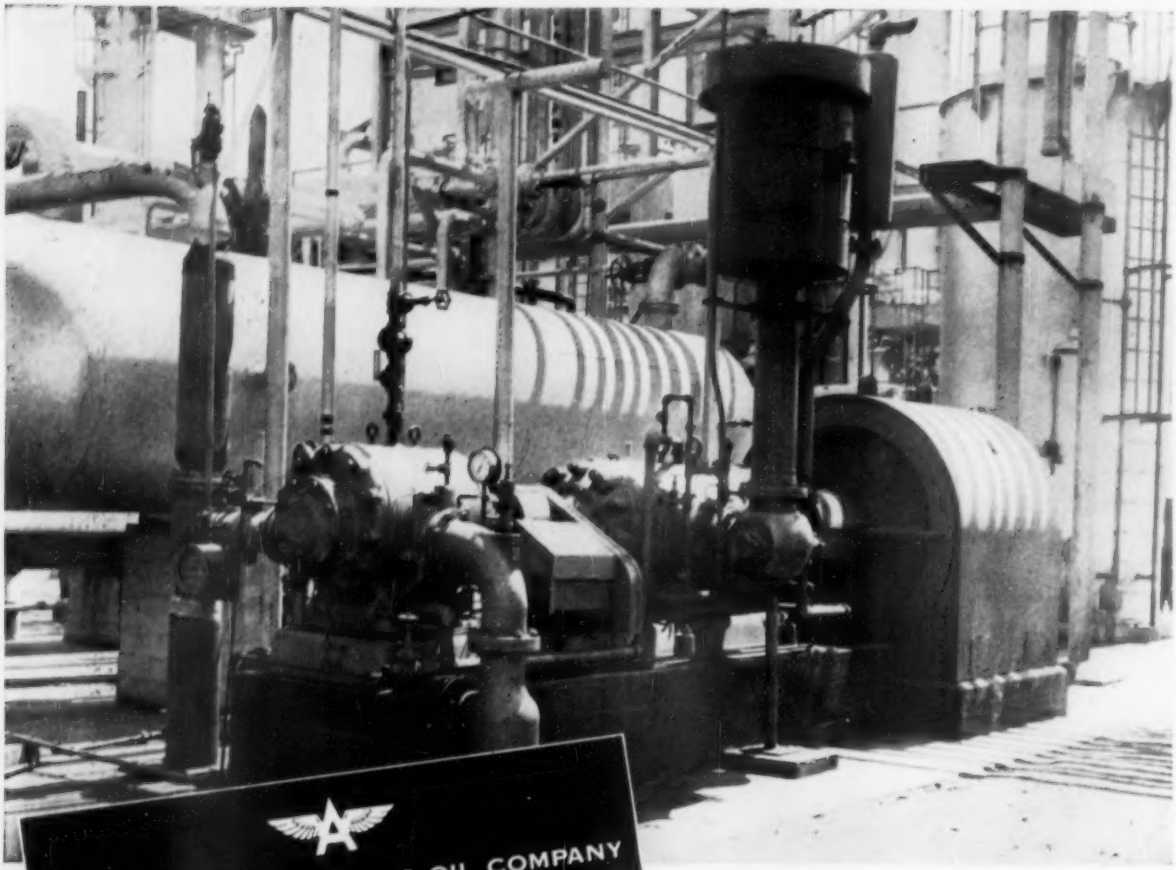
Name_____

Position_____

Firm_____

Address_____

City_____ State_____



installs fuller rotary compressors in its Avon Refinery

When Tide Water Associated needed additional air for various operations in its Avon plant, its engineers investigated the possibilities of the Fuller Rotary Compressor. After making a thorough study of its merits, Tide Water purchased and installed two C-300-300H two-stage units, each supplying 1598 c.f.m., 100-lb. air for general plant use, one of which is shown above. Note that this machine is installed out in the open with no protection from varying weather conditions, operating 24 hours per day, seven days a week.

These two-stage machines are located in different departments of the plant to best meet the air-load requirements of the particular department being served.

Tide Water also has installed in this same plant, two C-300 Fuller Rotary single-stage compressors with a capacity of 1542 c.f.m. each, at 40-lb. pressure, used in the catalyst-cracking process.

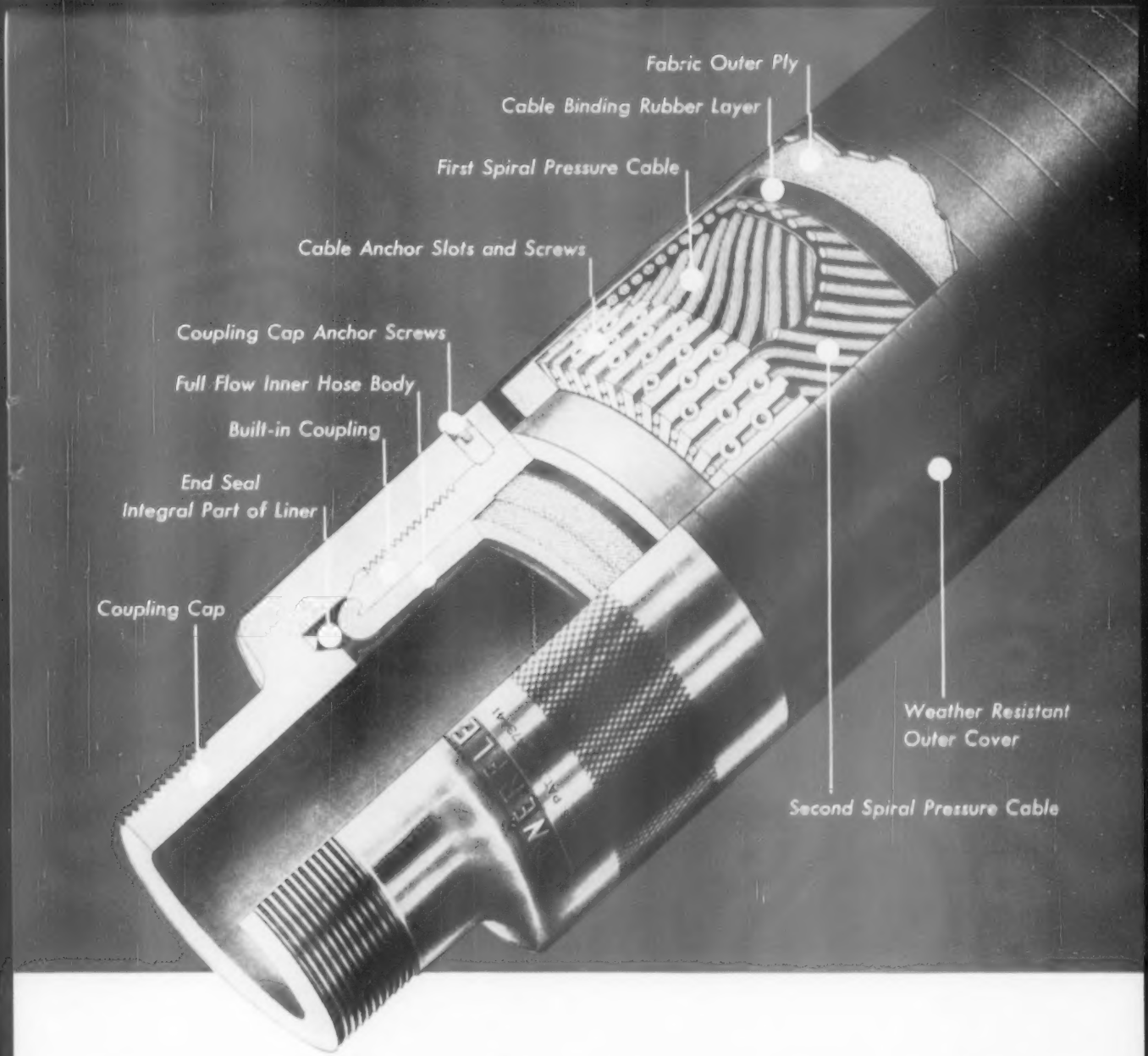
Hundreds of Fuller Rotaries are serving the petroleum industry, proving their worth for general plant air, purging gas, refrigeration in alkalization units, and handling butane-butylene in the refinery, as well as in the field for pressure boosting and gas gathering.

Simplicity of construction has proved to be one of the important factors—no valves to leak, no seats to grind, results in maintained capacity for the life of the machine; simplified drive eliminates power transmission losses. For full information write us for Bulletin C-5A.

Fuller
. . . . pioneers in harnessing AIR

FULLER COMPANY, Catasauqua, Pa.
GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY
Chicago · San Francisco · Los Angeles · Seattle · Birmingham

C-272
1572



Thermoid Powerflex Rotary Hose is built to go "all the way" in deep hole drilling!

33 miles of high tensile steel wire forms the cable that is precision wrapped, counter wrapped and imbedded in every length of Powerflex. Oil and abrasion resistant Neoprene tube and cover are reinforced with impregnated multi-ply woven fabric.

Patented Full-Flow couplings of forged steel are an integral part of the cable assembly . . . permanently secured *before* the hose is wrapped and cured. They positively cannot leak or pull off for the life of the hose.

Powerflex is proof-tested to 5000 ps before shipment . . . will withstand the highest pressures. Order Powerflex from your nearest supply store or one of the following Thermoid Warehouses:

Houston, Texas — Oklahoma City, Okla.
Casper, Wyo. — Nephi, Utah
Los Angeles, California

Thermoid

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

NORDBERG
Supairthermal®
ENGINE GEAR SET
for reducing gas pipe line transmission costs . . .

☆ *THERMAL EFFICIENCY IN EXCESS OF 40%*

☆ *LOWEST INSTALLED COST*

Savings of thousands of dollars per day in fuel costs on large capacity gas pipe lines can be realized with the Nordberg *Supairthermal* engine gear set, driving a centrifugal gas compressor, for the simple reason that less fuel is required to transport gas than by any other modern type of equipment.

This performance is possible through exclusive design principles which produce a thermal efficiency of better than 40 per cent—with increased horsepower, lower lube oil consumption . . . and lower maintenance costs per horsepower-hour.

Extremely compact and efficient, this unit can be installed with lower capital investment and operated at lower cost per horsepower-hour than any other type of gas pipe line prime mover.

Call or write for full details, outlining your requirements.

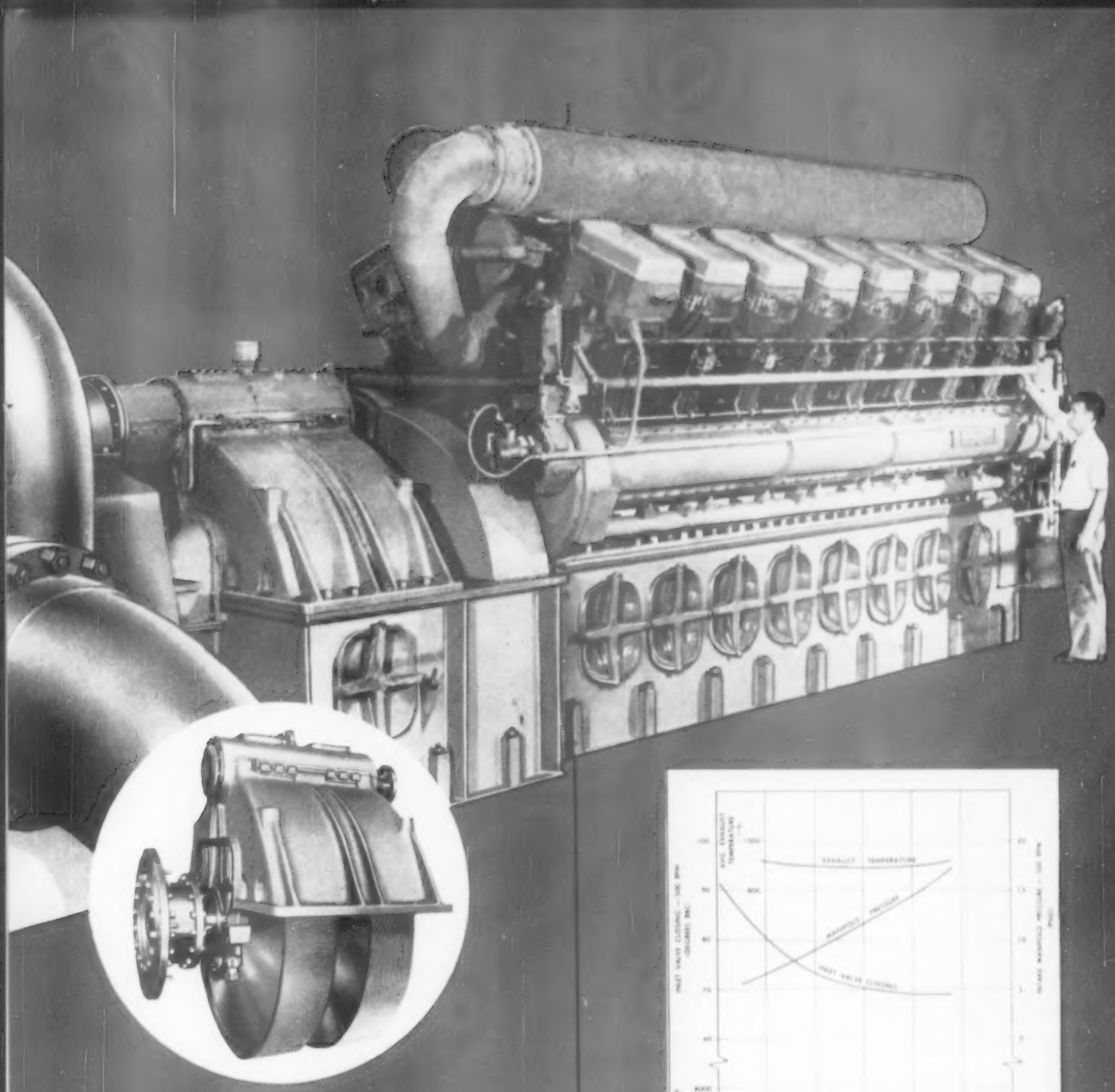
Nordberg *Supairthermal* V-type spark-ignition gas engine driving a centrifugal gas compressor. V-type engines for this service are built with 10, 12, 14 and 16-cylinders, offering a range up to 5,000 horsepower per engine.

NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

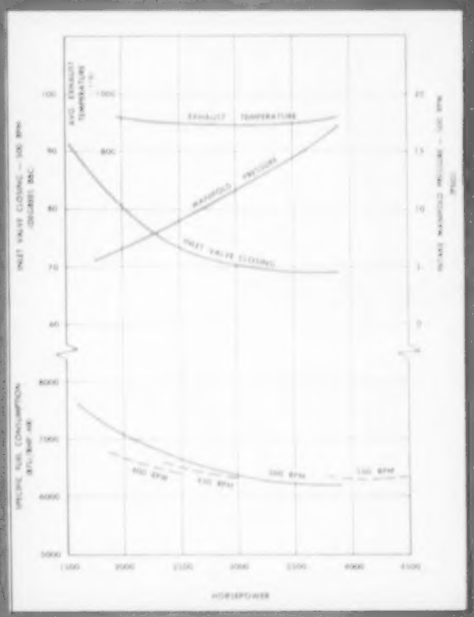
© 1955, Nordberg Mfg. Co.

0355



NORDBERG SPEED INCREASING GEAR...

The Nordberg *Supairthermal* engine drives the gas compressor through this compact close-coupled speed increasing gear, mounted on the bedplate extension of the engine. Latest engineering design advancements are incorporated in this gear for continuous, quiet operation and long life. A range of gear ratios from 6:1 to 10:1 is available in the built-in gear set without changing gear casings. This flexibility is highly desirable for future line capacity expansion.



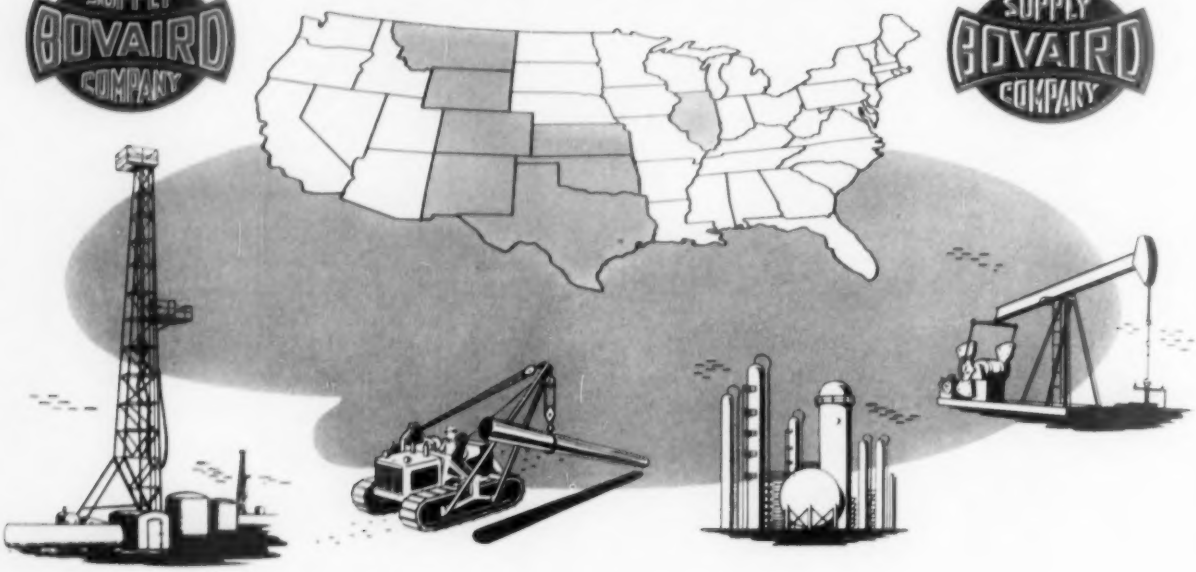
A typical Nordberg V-Type 16-cylinder *Supairthermal* Spark-Ignition Gas Engine performance chart.

NORDBERG MFG. CO., Milwaukee, Wisconsin

Builders of America's Largest Line of Heavy Duty Engines... 10 to over 12,000 Horsepower

For Supplies, Service and Savings

SUPPLY BOVAIRD COMPANY



SUPPLY BOVAIRD COMPANY

"Buy From Bovaird"

TO GET WHAT YOU WANT
WHERE YOU WANT IT
WHEN YOU NEED IT...
AT REASONABLE
COMPETITIVE PRICES

PESA

OFFICES AND STORES

COLORADO—Denver
ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, Great Bend, Liberal, Pratt, Russell, Wichita
NEW MEXICO—Lovington
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Pawhuska, Sapulpa, Seminole, Tulsa
TEXAS—Abilene, Borger, Dallas, Houston, Midland, Odessa, Pampa

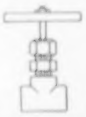
THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

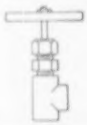
84 YEARS OF PROGRESS WITH THE OIL INDUSTRY

HOW TO SOLVE THE *tough* NEEDLE VALVE PROBLEMS

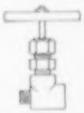
UNION BONNET
ANGLE PATTERN
(Female Ends)



SCREWED BONNET
STRAIGHT PATTERN
(Female Ends)



SCREWED BONNET
ANGLE PATTERN
(Female Ends)



SCREWED BONNET
STRAIGHT PATTERN
(Male End)

SCREWED BONNET
ANGLE PATTERN
(Male End)

SCREWED BONNET
STRAIGHT PATTERN
(Union End)

Teflon-packed American Needle Valves "lick" the really tough meter manifold jobs — sour gas, wet gas, odorizing, chemical plant and refinery applications and other difficult and corrosive field services.

Precision machined valve bodies (stainless or carbon steel) are specially suited for welding. Stainless steel valve stems, centerless-ground for exact fit, are designed so that the valves can be repacked under pressure. Positively aligned valve seats are burnished for point-contact seating.

Every valve is hydrostatically tested. Standard valves are designrated for 5000 psi working pressure at 70°F. Valves are also available for higher pressures to 10,000 psi and can be furnished, with graphite impregnated asbestos packing, for temperatures above 450°F.

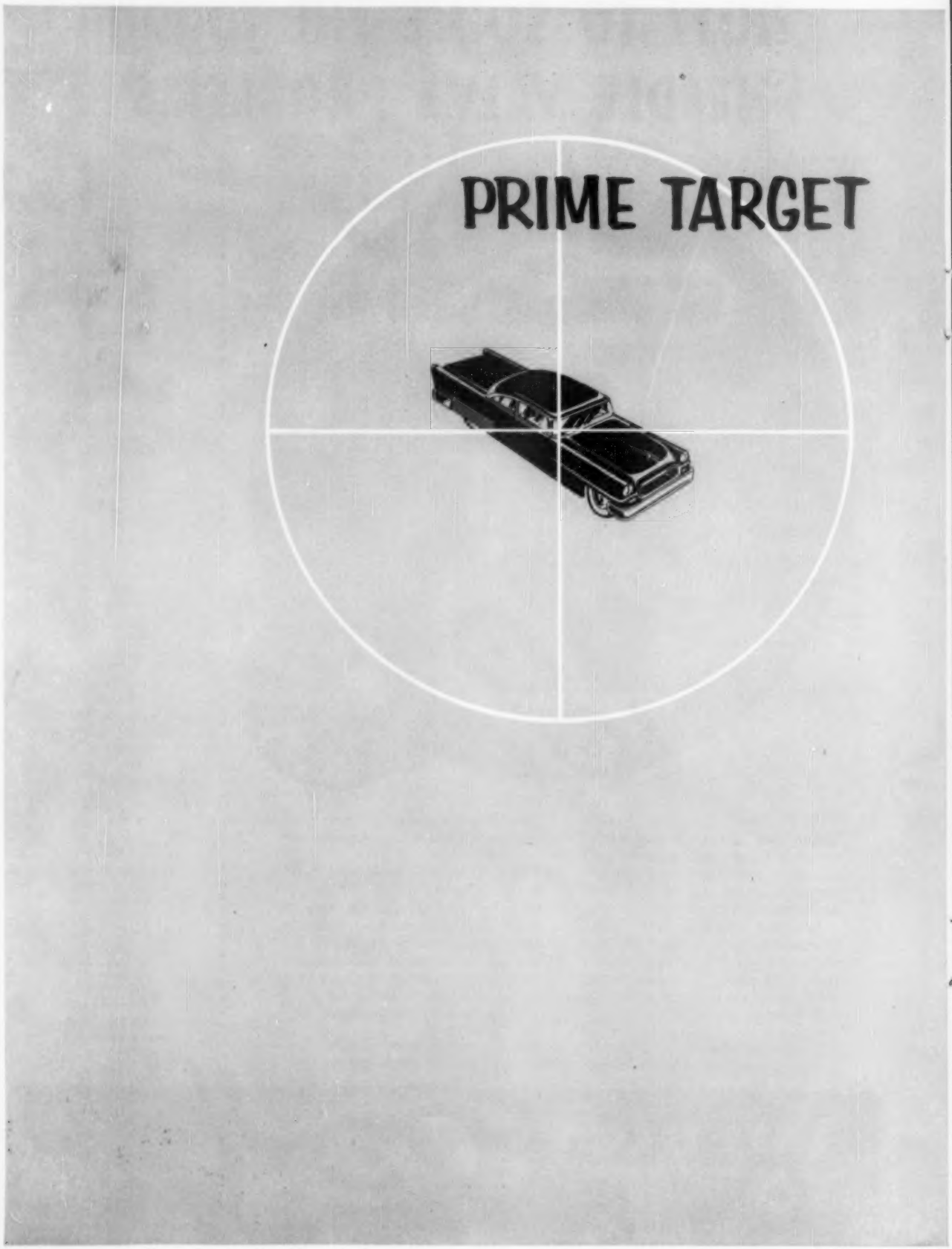
Write for Complete Specifications.

**In actual tests, Teflon packing prevented gland leakage through 124,000 on-and-off cycles, without tightening the packing nut.*

AMERICAN® METER COMPANY
INCORPORATED ESTABLISHED 1874

AMERICAN METER CO. PHILADELPHIA MEASUREMENT ENGINEERS

GENERAL SALES OFFICE: 1513 Race Street, Philadelphia
Albany • Alhambra • Atlanta • Baltimore • Birmingham
Boston • Chicago • Dallas • Denver • Erie • Houston
Kansas City • Los Angeles • Minneapolis • New York
Omaha • Pittsburgh • San Francisco • Seattle • Tulsa
IN CANADA: Canadian Meter Company, Limited
Hamilton, Ontario • Edmonton, Alberta


PRIME TARGET

OF PETROLEUM REFINING

. . better ways to make gasolines for tomorrow's engines!

UOP MAKES PETROLEUM PROCESSING MORE EFFICIENT . . . MORE ECONOMICAL . . . MORE PROFITABLE

Developing processing methods to keep gasoline performance equal to automotive engine design has been one of UOP's main objectives for over four decades.

A long list of important contributions began with thermal cracking . . . the first practical process to make more and better motor fuels . . . and has expanded with new and improved processing methods that have continually found *industry-wide* acceptance.

Platforming a Success!

Refiners, world-wide, now employ Platforming . . . the industry's first successful catalytic reforming process, originated and developed by UOP. The success of Platforming, under the widest possible range of operating conditions, is further evidence of the depth of technical knowledge and practical experience Universal applies to *every* processing problem.

Rexforming Now a Practical Reality!

UOP's latest contribution to modern-day refining is Rexforming. Immediate acceptance of this process for the economical production of super fuels indicates that it is a worthy companion to the many successful processes that Universal's knowledge and technical skills have provided.

Announced this year, Rexforming is rapidly gaining recognition and will soon be contributing to the industry's ability to adequately meet market demands for better, more powerful gasolines.

UNIVERSAL OIL PRODUCTS COMPANY

UOP 30 ALGONQUIN ROAD, DES PLAINES, ILLINOIS, U. S. A.

Forty Years Of Leadership In Petroleum Refining Technology

ONE OF A SERIES

You Get Many Benefits
By Specifying VICKERS Hydraulics

Reduced Maintenance Costs

Vickers Oil Hydraulic Equipment is built to minimize maintenance . . . has an outstanding performance record. Nevertheless, Vickers recognizes that sooner or later any piece of machinery requires overhaul. So we have developed a service department of exceptional efficiency . . . one that is convenient for you by reason of full time factory-trained service men working out of our offices from coast to coast.

Shown below are several of the practical aids provided to assure you quick and economical service on Vickers Hydraulics.

VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
1444 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices:
ATLANTA • CHICAGO • CINCINNATI • CLEVELAND
DETROIT • HOUSTON • LOS ANGELES AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Summit, N. J.) • PHILADELPHIA AREA (Media) PITTSBURGH AREA (Mt. Lebanon) • PORTLAND, ORE. • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA WASHINGTON • WORCESTER
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto

SPARE PARTS RECOMMENDATIONS

Our service men will study your situation and make practical recommendations on your spare parts inventory . . . will check your inventory and provide you with printed lists of parts usually required.

SERVICE KITS

Packaged repair kits for many Vickers products are available. These provide all needed parts for quick repair in the field and at minimum cost. In addition, these kits simplify stock problems by reducing the number of loose parts.

PREVENTIVE MAINTENANCE

Our service men will gladly set up for you an effective program of preventive maintenance on a timetable basis. This avoids costly down time and keeps maintenance costs at a minimum.

SERVICE SCHOOL

Vickers maintains a Hydraulics Training School for engineering, maintenance and service personnel of both original equipment manufacturers and their customers. For further information, please contact Product Service Department directly.

7143

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Additional profits for operators everywhere are realized by recovering good, useable oil from basic sediment and water. Pumping from storage tank bottoms to heater treaters to save the oil normally burned each year in slush pits, is one of many jobs Marlow Self-Priming Centrifugal Pumps do quickly and efficiently throughout the oil country.

marlows are durable!

Marlow Self-Priming Pumps and Marlow "Mud Hog" Diaphragm Pumps make a team that can't be beat for tough oil-country pumping jobs. Marlows have proved their durability for majors and independents alike on rugged trouble-free service. Veteran oil men are making Marlow their first choice for long, dependable service. Make sure with Marlow . . . get the facts from your Marlow dealer or write for Bulletin O-53.

MARLOW PUMPS • RIDGEWOOD, NEW JERSEY

Division of BELL & GOSSETT COMPANY

...thank you for your service

Oil Center Tool Company
Shreveport, Louisiana

Attention: Mr. Herb Stewart

Gentlemen:

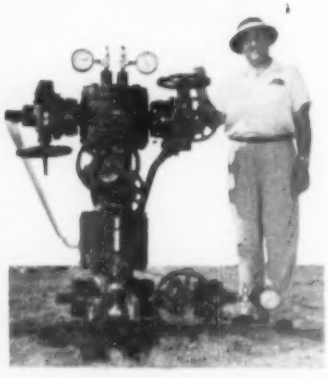
This is to advise you that I am gratified and pleased with my O-C-T Dual Christmas Tree. Everything worked perfectly, and I wish to thank you for your service and O-C-T for manufacturing this head for me in this connection.

I strongly recommend it to anyone making dual completions for safety, economy and efficiency.

If I should have occasion to use this on my next well, I will appreciate your taking care of me as you have on my No. 4 Smith Lindsey well. I have completed a nice gas well and a splendid oil well through this tree, 100%.

Very truly yours,

B. B. Orr
Longview, Texas



This unsolicited letter from Mr. B. B. Orr is further testimony to the fact that . . . if you make a dual completion . . . it will pay you to make it O-C-T. Dual completion equipment was pioneered and introduced **first** by O-C-T as early as 1941. O-C-T Dual Trees provide you with substantial savings. If you are considering dual completions, ask your nearest O-C-T representative for details on this safe, strong and practical means to your economic goals.

OIL CENTER TOOL COMPANY

DU PONT
REG. U.S. PAT. OFF.

PETROLEUM CHEMICALS DIVISION

NEWS

DU PONT
REG. U.S. PAT. OFF.

November ★ One of a Series of Interest to the Petroleum Industry ★ 1955

NEW DU PONT TEL PLANT NOW UNDER CONSTRUCTION IN CALIFORNIA

On August 24, near Antioch, California, the ground was officially broken for construction of Du Pont's new West Coast tetraethyl lead manufacturing plant. Many local Antioch dignitaries were on hand for the ground breaking ceremony.

This California plant site has much to recommend its choice by Du Pont . . . including the local availability of necessary labor skills, its convenient location in the heart of a growing market for TEL, adequate supplies of power and good water, plus the option of water or rail shipments.

In addition to employing the most modern continuous process methods of manufacturing TEL, the new plant will include a unique new waste disposal system. The waste materials will be discharged into a deep underground well—in excess of 6,000 feet to eliminate any danger of contaminating surface water.

A new plant for manufacturing Du Pont "FREON" is also being built on the Antioch site.

Two lube oil additives to help you sell fleet contracts

For refiners interested in fleet contracts, Du Pont's two polymeric lube oil additives offer special sales advantages, especially with owners of fleets in low-duty, stop-and-start use.

Du Pont Lube Oil Additive 564 and Du Pont Lube Oil Additive 565 provide an economical and effective means of preventing engine oil sludge. They are particularly effective under low-temperature, low-power, stop-and-go driving conditions. Both work as detergents and V. I. improvers.

LOA-564, with its lower molecular weight gives an engine oil with excellent shear stability. The higher molecular weight of LOA-565 gives greater viscosity index improvement.

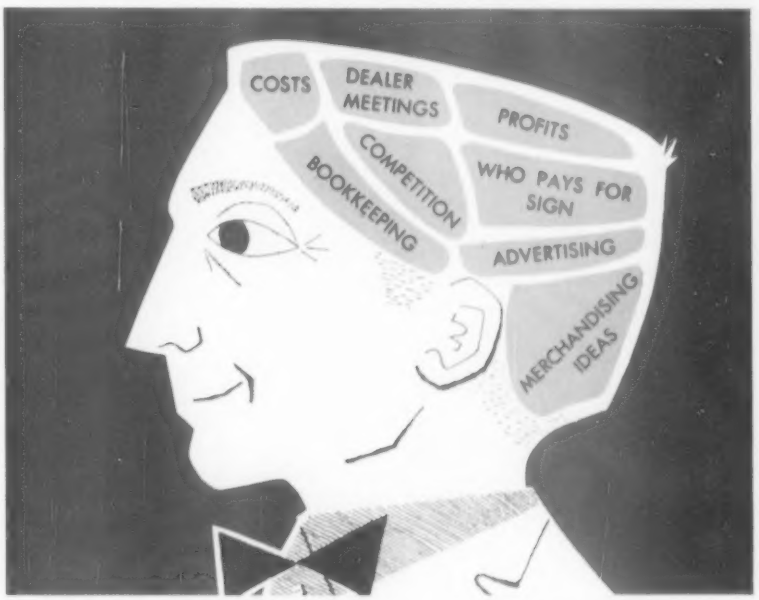
Both are ashless. They keep engine oil systems clean and free of sludge under severe conditions . . . contribute to longer engine life.

Besides providing extra sales appeal for fleet customers, the benefits of these additives offer exceptional promotion and marketing opportunities with the mass passenger car field. Information and samples are available through your Du Pont representative or sales office.

What Do Your Dealers Really Think...

Of your dealer meetings? . . . Your advertising? . . . Your dealer publications and sales promotion aids?

Report No. 3 of the new Du Pont survey—"The Service Station Operator"—is now off the press. If you want to get behind the scene at the pump island and study the effect of your promotion program on your dealers, you'll surely want to take an early peek at the results of this survey.



Increasing the merchandising savvy of the service station operator is probably the chief objective of all dealer training and promotion programs. But to achieve this, you first need the interest and cooperation of the dealers themselves.

The index of this interest and cooperation can be found, we believe, in the dealers' answers to questions asked them in this recent dealer survey.

Are they helpful?

The dealers were asked how many meetings their company invited them to each year . . . and how many of these they attended. Their answers, you'll find in the survey report, ranged all the way from none to a baker's dozen. But what was accomplished at these meetings is the most important thing.

You'll be glad to know that a large majority of them found the meetings *helpful*. How? Their answers ranged all the way from "sales tips" to "news of trade." And the survey report will also tell you what parts of the program are actually *put to work at the station* by the dealers.

What they want

Some dealers, the survey found, would like to have their supplier companies do *more* for them. And they listed several things specifically. Station modernization was one of the things most frequently mentioned. Many of them also indicated they would like to see revisions in the companies' advertising.

Telling is selling

How do the dealers feel about their supplier's policies on rental arrangements, advertising, competitive pric-

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

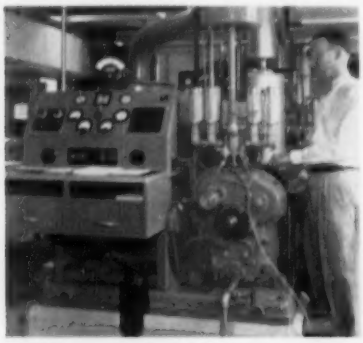
PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

New, Modern Regional Laboratory at Tulsa

A complete modernization program has just been completed at the Du Pont Mid-Continent regional laboratory in Tulsa, Oklahoma. The photographs below show how the air-conditioned lab building has been modernized and new equipment added. Improved customer service is the objective.

Over-all view of the new regional laboratory interior. You can also see from this picture that the regional lab people take considerable care with their housekeeping.



H. M. Carey operating the Tulsa lab's new CFR octane number test engine.

The new set-up at the laboratory for analyzing copper, antioxidant and metal deactivator content. This equipment is also used for color work. Blake Partain is shown in the foreground.

MID-CONTINENT REGIONAL LAB MANAGER

E. Odell Campbell joined the Du Pont Petroleum Chemicals Division in 1951. Since that time he has managed the Division's Mid-Continent regional laboratory in Tulsa, Oklahoma. He is in charge of Du Pont customer service, product testing, and additives treating recommendations in the region.

Following college, he did general petroleum testing, and later was made a Petroleum Chemist in charge of a phase of the research work at the Bureau of Mines Petroleum Experimental Station in Bartlesville.

During World War II he was a commissioned officer in the U. S. Navy. From 1945 to 1951 he served with the Munitions Board. There his job as a chemical engineer included petroleum planning and coordination of technical petroleum problems for the three military services.

Mr. Campbell received his B. A. degree in Chemistry at the University of Oklahoma, and later studied at the University of Arizona and George Washington University. He is a member of the American Chemical Society, Alpha Chi Sigma Fraternity, and the American Association for the Advancement of Science.

E. ODELL CAMPBELL

CONTINUED

Dealer Survey

ing, training programs, etc.? In general, when the dealers know and understand these policies, they like them. However, a large number of dealers, so the survey found, are not aware of their supplier's policies on these matters.

In addition to the above areas, this Report No. 3 delves into the dealer's opinions of dealer publications, overall company advertising and point-of-sale merchandising displays. Their opinions of supplier representatives are also documented. And the report includes information on the dealer's own advertising programs, too.

Complete series of reports

The previous two reports in the series cover (1) such dealer retail functions as station hours, gallonage, credit and mailing lists; and (2) dealer knowledge of products, additives, sales assets and prices. Future reports, to be published soon, will discuss (4) employee-dealer relationships, dealer associations, his educational background and income; and (5) the interrelationship of all the above factors . . . such as how station hours, dealer meetings and education affect sales volume.

Continuing market research

Sponsored by Du Pont, the survey was conducted on a completely impartial basis by National Analysts, Inc. It is nationwide in scope and part of the continuing market research work of the Du Pont Petroleum Chemicals Division. It follows the recent Du Pont survey of service station customer buying habits.

For more information about this survey, just get in touch with any of our representatives or sales offices listed below.

DU PONT

Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.) *Petroleum Chemicals Division* • *Wilmington 98, Delaware*

Sales Offices:

CHICAGO, ILL.—8 So. Michigan Ave.	Phone RAndolph 6-8630	PHILADELPHIA, PA.—3 Penn Center Plaza	Phone LOcust 8-3531
DETROIT, MICH.—13000 W. Seven Mile Rd.	Phone UNiversity 4-1963	PITTSBURGH, PA.—Room 510, Alcoa Bldg.	Phone ATlantic 1-2933
HOUSTON, TEXAS—705 Bank of Commerce Bldg.	Phone CApitol 5-1151	SAN FRANCISCO, CAL.—Room 626, 111 Sutter St.,	Phone EXbrook 2-6230
LOS ANGELES, CAL.—612 So. Flower St.	Phone MAdison 5-1691	SEATTLE, WASH.—Room 215, 4003 Aurora Ave.	Phone MElrose 6977
NEW YORK, N. Y.—1270 Ave. of the Americas	Phone COlumbus 5-2342	TULSA, OKLA.—P. O. Box 730	Phone LUther 5-5578

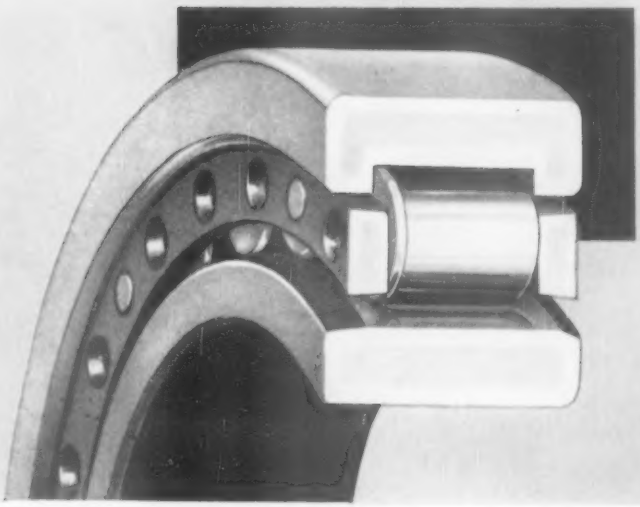
IN CANADA: Du Pont Company of Canada Limited—Petroleum Chemicals Division—80 Richmond Street West—Toronto 1, Ontario
OTHER COUNTRIES: Petroleum Chemicals Export—Nemours Bldg., 6539—Wilmington 98, Delaware

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-277

Printed in U. S. A.

Bower straight roller bearings carry maximum loads!



TWO-LIP RACE INCREASES RIGIDITY— IMPROVES ROLL ALIGNMENT

Examine the cutaway view of the Bower straight roller bearing, shown above. It is important to note particularly the two parallel lips made integral with the outer race. These lips or shoulders provide a rigid, durable construction—keeping the rolls in proper alignment.

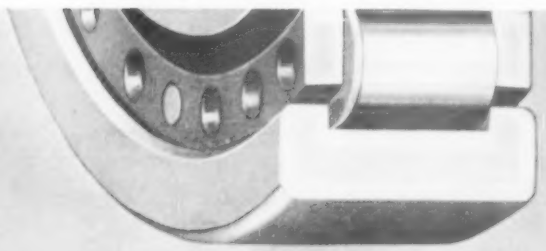
Built of highest quality materials, Bower straight roller bearings have proved themselves capable of standing up day in and day out under maximum loads and the most rugged conditions—with virtually no maintenance whatsoever. They are used extensively in such fields as automotive, earthmoving, farm equipment and heavy machine tool. For the aircraft industry, Bower builds straight roller bearings—especially designed for high-speed, high-temperature operation—which are used by virtually every producer of jet engines.

Whatever you manufacture, you'll build a better product with Bower roller bearings. Write to Bower today. A Bower engineer will give you full details of the complete Bower line.

BOWER ROLLER BEARING DIVISION
FEDERAL-MOGUL-BOWER BEARINGS, INC., DETROIT 14, MICH.

BOWER

ROLLER BEARINGS



A COMPLETE LINE OF TAPERED, STRAIGHT AND JOURNAL ROLLER BEARINGS

You get both with General Controls

. . . H-series HYDRAMOTOR valves

It takes Brute Force to open a single-seat valve against line pressure—but you need single seating to guarantee permanently perfect closure. So you need both. *And you get both with General Controls.*

You get even more: No gear problems with its electro-hydraulic action . . . sealed unit safety for top efficiency in any weather . . . instant response to simple two-wire control, with three-wire available for remote positioning.

When you lay out cost-saving automatic transfer systems, count on General Controls to simplify your problems with dependability proved by over 15 years in the field—and a complete range of sizes, materials and speeds to meet the varied needs of the food, process, and oil industries.

General Controls *Hydramotor* VALVES

For more detailed information, send for HYDRAMOTOR CATALOG, 801 Allen Ave., Glendale 1, Calif.

15 YEARS

GENERAL CONTROLS

MANUFACTURERS OF AUTOMATIC CONTROLS FOR HOME, INDUSTRY AND THE MILITARY

GENERAL CONTROLS • PERFEX CONTROLS

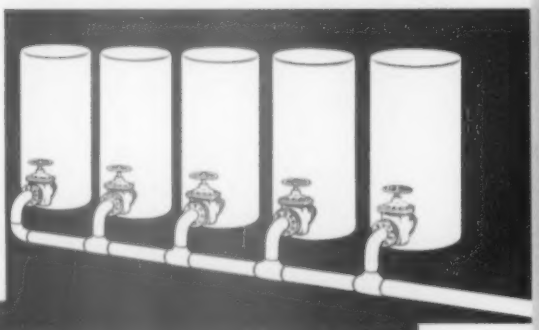
40 FACTORY BRANCH OFFICES SERVING THE UNITED STATES AND CANADA

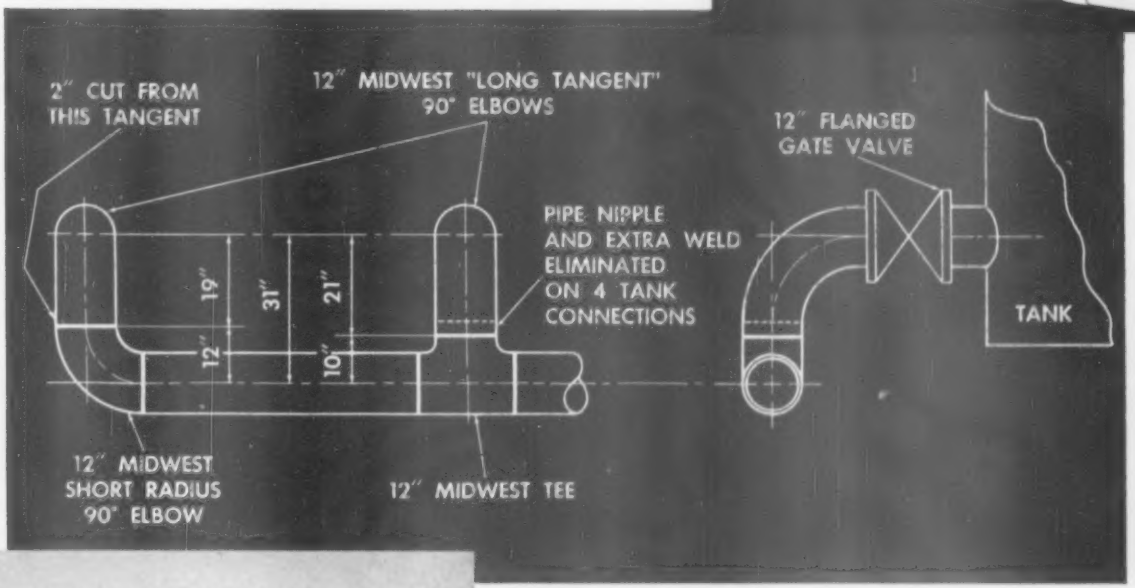
FIVE PLANTS: IRON MOUNTAIN, MICHIGAN • GLENDALE, CALIFORNIA • BURBANK, CALIFORNIA • SKOKIE, ILLINOIS • GUELPH, CANADA

MIDWEST "LONG TANGENT" ELBOWS

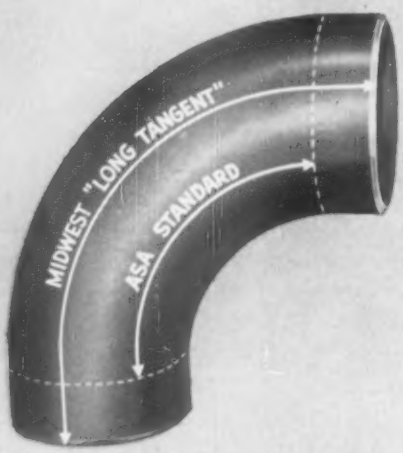
SAVED $156.20

On This Welding Piping





MIDWEST "LONG TANGENT" ELBOWS COST NO MORE THAN OTHER ELBOWS



The Problem:

To connect the five tanks shown in the sketch at top to a common 12" header.

The Difficulty:

The center-to-outlet dimension of the 4—12" tees is only 10", while the shortest elbow available measures 12" center-to-end. Thus, if standard long radius elbows are used next to the five tank valves, four short nipples and four extra 12" welds would be required.

The Solution:

By using Midwest "Long Tangent" elbows as shown in the blueprint, the expense of the four extra nipples and welds was eliminated at the cost of just one cut! The actual net savings made by "Long Tangent" elbows on this job was $156.20.

Remember—Midwest "Long Tangent" elbows cost no more than regular elbows! For further information, write for Catalog 54.

MIDWEST PIPING COMPANY, INC.

Main Office, 1450 South Second St., St. Louis 4, Missouri

PLANTS: ST. LOUIS, PASSAIC, and LOS ANGELES

SALES OFFICES: NEW YORK 7—50 CHURCH ST. • LOS ANGELES 33—520 ANDERSON ST.
BOSTON 27—426 FIRST ST. • CHICAGO 3—79 WEST MONROE ST.
TULSA 3—224 WRIGHT BLDG. • HOUSTON 2—1213 CAPITOL AVE.
CLEVELAND 14—616 ST. CLAIR AVE. • MIAMI 34—2103 LE JEUNE ROAD

6820

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

PERFORMANCE AND PRICE...

make Benson Aluminum Drums Ideal for Norda Essential Oil & Chemical Company, Inc.

PROBLEM:

Shipment of aromatic and essential oils for cosmetics and food stuffs by Norda Essential Oil & Chemical Co., New York.
(Galvanized and steel drums cause contamination of oil products. Glass containers too fragile—stainless steel too expensive.)

SOLUTION:

Purchase of 600 Benson Aluminum Drums
(Strong, light, corrosion resistant aluminum drums prevent contamination, are highly durable, provide easier handling and storage.)

Light weight of aluminum drums facilitates handling and shipping.

Aluminum drums protect against contamination and shipping damage.

Durable aluminum drums have a long, useful life—despite hard usage.

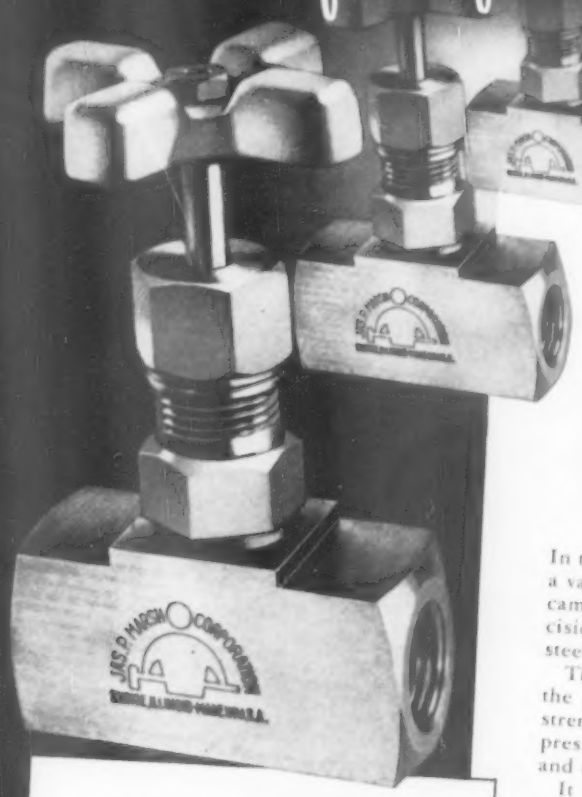
First cost alone is only the beginning of the savings advantages of Benson Aluminum Drums. Replacements are less frequent—aluminum drums won't rust or shatter. Light weight saves on handling and shipping charges. There are no costs for application of protective coatings . . . no losses through contamination of chemical contents. For further information contact the Reynolds office listed under "Aluminum" in your classified directory or write *Reynolds Metals Company, P.O. Box 1800-CR, Louisville 1, Ky.*

See Our Exhibit at the 25th Exposition Chemical Industries Philadelphia, Dec. 5-9

REYNOLDS ALUMINUM

EXCLUSIVE SALES AGENTS FOR BENSON CHEMICAL DRUMS

Now the finest of needle valves is available



416 Stainless throughout...

In the Marsh Needle Valve, operating men found a valve that was better all the way through. Then came the call for a valve of like quality and precision for corrosion service . . . to be 416 stainless steel throughout.

The valve illustrated here is the answer. Like the parent valve, this new valve has safety and strength to spare . . . guaranteed for working pressures up to 10,000 psi . . . equally efficient and effective in any lower pressure range.

It too is machined from solid bar stock—in this case, 416 stainless steel. Its precision-ground and-machined stem is hardened 416 stainless. Packing is the special "Marpak" ring . . . one-piece, non-binding, long-lasting. So finely built is this needle throttling and cut-off valve that it can be easily throttled down to exceptionally fine regulation even on extreme pressure.

Read the list of features opposite. Then write for new bulletin No. NV-2 containing complete details.

416 Stainless Steel
...all the way through!

- Body and stem guide machined from bar stock.
- Valve stem, hardened stainless.
- Packing, special Marsh "Marpak" moulded ring.
- Fine stem threads for strength and precision throttling.
- Deep inlet and outlet thread chambers.
- Bodies marked in accordance with MSS regulations.

The new all stainless valves (Series 1924) includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾", 1"; also globe and angle valves with male inlet and female outlet in sizes ¼" and ½".

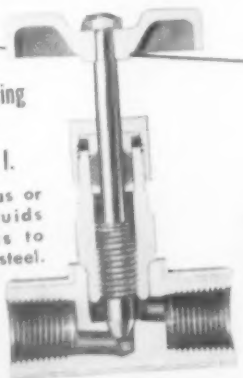
MARSH INSTRUMENT CO. Dept. L, Skokie, Ill.
Sales affiliate of Jas. P. Marsh Corp.

Marsh Instrument & Valve Co. (Canada) Ltd.
8407 103rd Street, Edmonton, Alberta, Canada

HOUSTON BRANCH PLANT: 1121 Rothwell Street, Sect. 15, Houston, Texas

Maximum Working Pressure 10,000 P.S.I.

Water, oil, gas or corrosive fluids not injurious to 416 stainless steel.



MARSH

"THE STANDARD OF ACCURACY"

Performance-- Value...

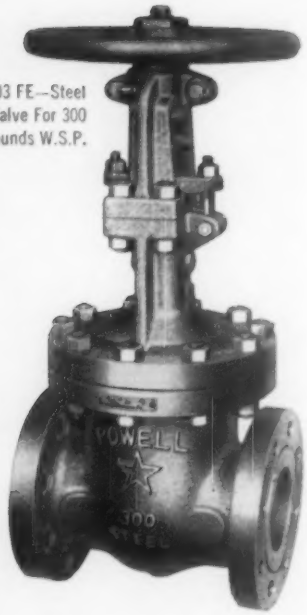


FIG. 3003 FE—Steel Gate Valve For 300 Pounds W.S.P.

FIG. 1561—150-Pound Steel Swing Check Valve.

. . . POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES . . .

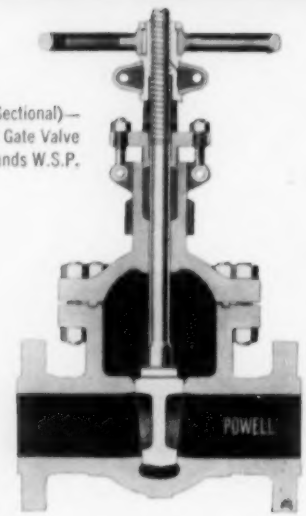
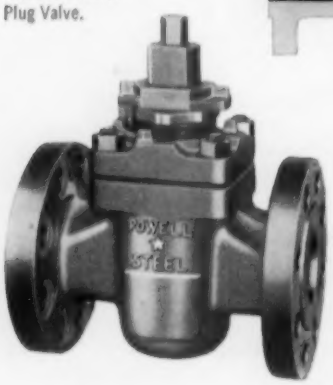


FIG. 6003 SS (Sectional)—Alloy Steel Gate Valve For 600 Pounds W.S.P.

Powell Valves

FIG. 1559—150-Pound Steel Lubricated Plug Valve.



You can depend on outstanding *performance* from every valve made by The Wm. Powell Company, for Powell Valves have a proven record of long life and dependable service.

And Powell Valves give you better *value!* They're precision made and incorporate many quality features—features that can save you money and give you lasting flow control.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our *COMPLETE quality line*, and help solve any flow control problem you may have.

The Wm. Powell Company, Cincinnati 22, Ohio . . . . . 109th year

THE Wilson WINCHMOBILE

MOGUL "42" TORCAIR MODEL

RATED CAPACITY 16,000 Feet 2½" Tubing | **OVERALL DIMENSIONS** Length: 54 feet Width: 96 inches Height: 13 ft. 6 in. | **WEIGHT** Front Axles 26,250 lbs. Rear Axles 41,520 lbs. Total 67,700 lbs.

FEATURES

- Drums mounted directly on vehicle frame, which eliminates the winch frame, saving several thousand pounds of weight.
- Mogul "42" double drum Torcair winch.
- Line capacity, upper drum, 16,200 ft. 9/16".
- Line capacity, lower drum, 5,500 ft. 7/8".
- Full air controls on winch located where desired.
- Aluminum pressure plates on Air-Tube clutches.
- Fabricated angle steel frame of "Man-Ten" steel.
- Mogul 96' fabricated angle steel mast, 260,000 lbs. capacity.
- Optional 90', 96' and 102' masts.
- Mast hydraulically raised, telescoped and with kickover jacks.
- No ground guy lines needed for most ordinary loads.
- Outrigger for mast wind bracing.
- General Motors 12107 *Twin* six diesel engine, with Allison torque converter.
- Engines optional, GM 110, Waukesha WAKBU and others.
- Allison TG-617 Torqmatic transmission with air controls.
- Parkersburg 15" double Hydrotarder with Air-Tube clutch.
- Eaton 82-F dual front axles with 11.00-20 tires.
- Both sets of front wheels steer, no dragging tires.
- Air power steering.
- Can be built in Mogul "42" or Super "38" size winch.
- Front Tandem axle suspension system of Wilson design using Hendrickson beams, is the simplest, lightest, and strongest system yet designed.

BE MODERN - BUY WILSON

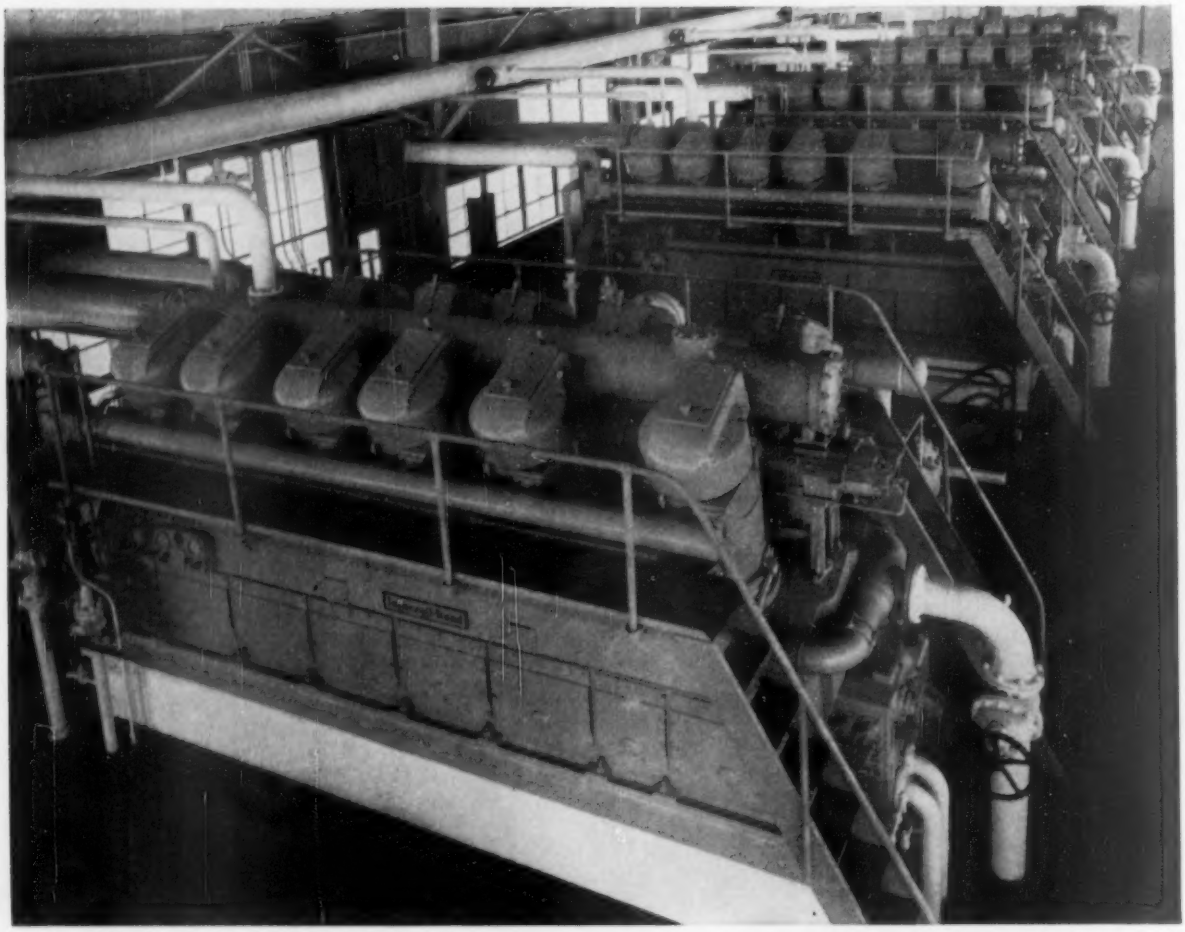
Wilson

WILSON MANUFACTURING CO., INC.

WICHITA FALLS, TEXAS, U.S.A.

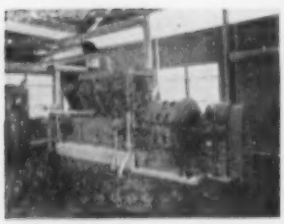
The Home of RED IRON

TENNESSEE GAS employs at Coudersport storage

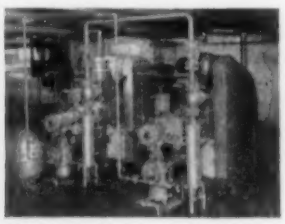


Ingersoll-Rand KVG gas-engine compressors on natural gas storage and transmission service at Tennessee Gas Transmission Company's Coudersport (Pa.) station. Each unit is rated 1320 hp.

OTHER I-R EQUIPMENT AT COUDERSPORT STATION

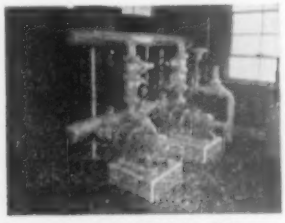


PSVG-8 gas engine, rated 544 hp, driving a 380-kw synchronous generator for supplying plant power.



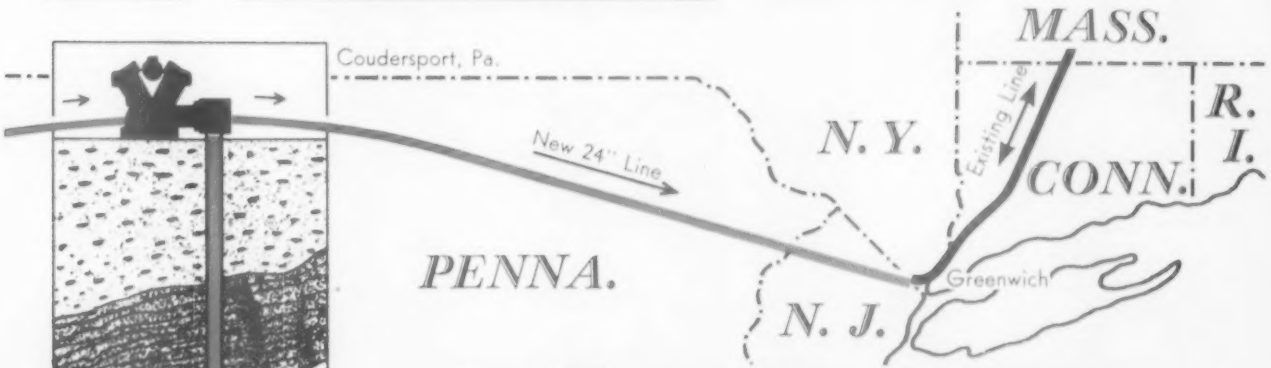
Two electric motor-driven Type ES compressors supplying 250-psi starting air for the KVG compressors.

Two Class LFV centrifugal pumps supplying jacket cooling water for the KVG's; each pump rated 2200 gpm, 60-ft. head.



Two Class RVL Motor-pumps supplying jacket cooling water for the PSVG gas engine; each pump rated 312 gpm, 59-ft. head.

four-cycle flexibility and transmission station



Ten KVG gas-engine compressors on unusual dual-purpose job serve New York City area

Billions of cubic feet of southwestern gas are now being inhaled by Pennsylvania's once-productive Hebron gas field, to be exhaled through a new 250-mile pipeline when winter weather swells New York City's gas needs. This new system is a part of the growth of Tennessee Gas Transmission Company, and the lungs of the system are ten Ingersoll-Rand KVG gas-engine compressors totalling 13,200 hp at TGT's Coudersport (Pa.) pipeline station.

These compressors inject the gas into the underground storage field, and later boost it through the line to the consumers. Compressors on such a double-duty job must operate over a wide range of speeds and loads — a need well met by the inherent flexibility of I-R four-cycle machines. (For example, these KVG's operate from 300 to 1600 psig intake, and 900 to 2500 psig discharge.)

These V-angle, 4-cycle units actually deliver smooth power without skipping or stalling, all the way from full load to no load, from half speed to full speed, and with generous reserve for temporary overloads. All this, plus the proven dependability and trouble-free performance of I-R compressor cylinders and valves.

For sustained top performance under the most demanding conditions, it pays to specify Ingersoll-Rand 4-cycle gas-engine compressors. Ask your I-R representative to show you how these heavy-duty units can make long-range savings in your compression costs.

Cross-section of underground storage field, where vast quantities of natural gas are injected into porous sands capped by thousands of tons of rock and shale.

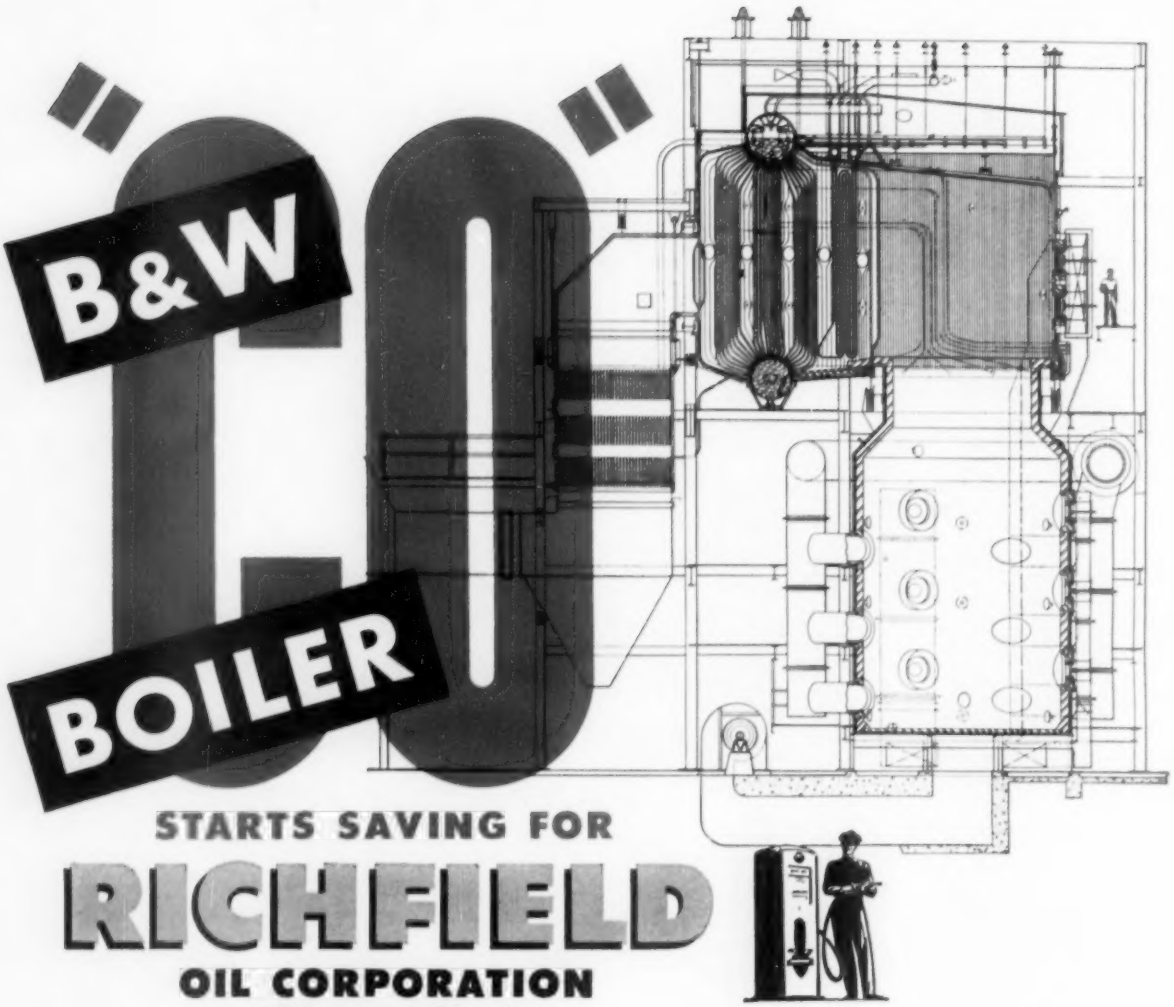
Ingersoll-Rand

6-268

11 Broadway, New York 4, N. Y.

4-CYCLE

COMPRESSORS • PUMPS • AIR AND ELECTRICAL TOOLS • VACUUM EQUIPMENT • ROCK DRILLS • CONDENSERS • GAS AND DIESEL ENGINES



STARTS SAVING FOR

RICHFIELD

OIL CORPORATION

at Watson, California

Another big stride in waste heat reclamation was made at Richfield's Watson refinery when their new B&W CO (Carbon Monoxide) Boiler recently went on stream.

Utilizing the combustible carbon monoxide, as well as sensible heat, from the catalyst regenerator, the CO Boiler saves heat previously expelled to the atmosphere and wasted. From now on this heat will be burned and harnessed—a saving that is reckoned in thousands of dollars.

In addition, the boiler is an independent source of steam power for the entire fluid unit and its auxiliaries—available for steam even when the cracking unit is shut down.

Its maximum continuous capacity is 340,000 lb of steam per hr at a pressure of 600 psi and a temperature of 750 F, burning either oil or gas as supplementary fuels.

G-719

Besides representing a significant economic advance, the CO Boiler is an outstanding example of cooperation among companies with the common goal of lowering operating costs and raising an already outstanding efficiency still higher. C. F. Braun Company, the contractors, Richfield Oil Corp., and B&W—all are major contributors to what is rapidly proving to be a *saving* advance in the petroleum industry. Let us discuss with you and with your consulting engineers the working advantages of the B&W CO Boiler and give you additional details. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

BABCOCK & WILCOX

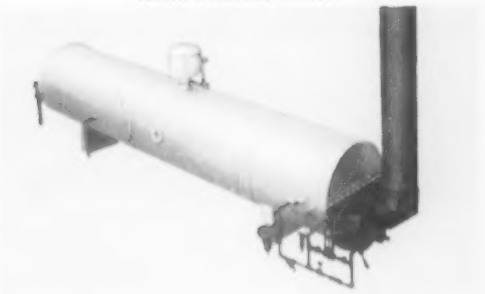
BOILER DIVISION

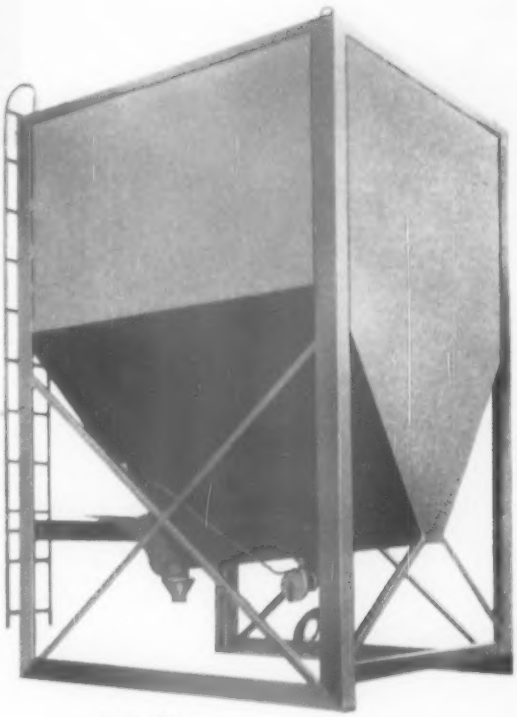
Bolted Steel Tanks

Oil and Gas Separator, Patent Pending

Delta Emulsion Treater

Delta Indirect Heater





Delta Rig Storage Bin

THE DELTA RIG STORAGE BIN

. . . WITH CUSTOM-MADE FULLER AIR SLIDE CONVEYOR, MAINTAINS ACCURATE FLOW OF DRY MATERIALS.
NO STICKING.
NO CLOGGING.
AVAILABLE AT THREE CONVENIENT LOUISIANA POINTS.

Drillers are enjoying a new standard of efficiency with this new Delta Rig Storage Bin. The Fuller Air Slide Conveyor is custom-made for this container. Activated by a heavy duty, two-speed, AC-DC blower, there are no valves to stick, no pipes to clog. The spherically designed rotary flow gate maintains an accurate flow of dry materials at any desired rate. Electrical control switch is mounted on front of bin. For complete details on this highly successful, new Delta unit, write or call us. The bin is just one of the modern units of equipment now available from our plant at Baton Rouge, or convenient stock points at Westwego and Lafayette, Louisiana.

Delta's Main Plant at Baton Rouge, La.

Write, wire or call for further details

DELTA TANK MANUFACTURING CO. INC.

111 Bridge City Ave. Westwego, La. | Scott Road Lafayette, La. | Choctaw Dr. Baton Rouge, La.

EXPORT OFFICE: INTERNATIONAL TRADE MART, NEW ORLEANS, LA.
MANUFACTURERS OF PRESSURE VESSELS AND OIL FIELD EQUIPMENT

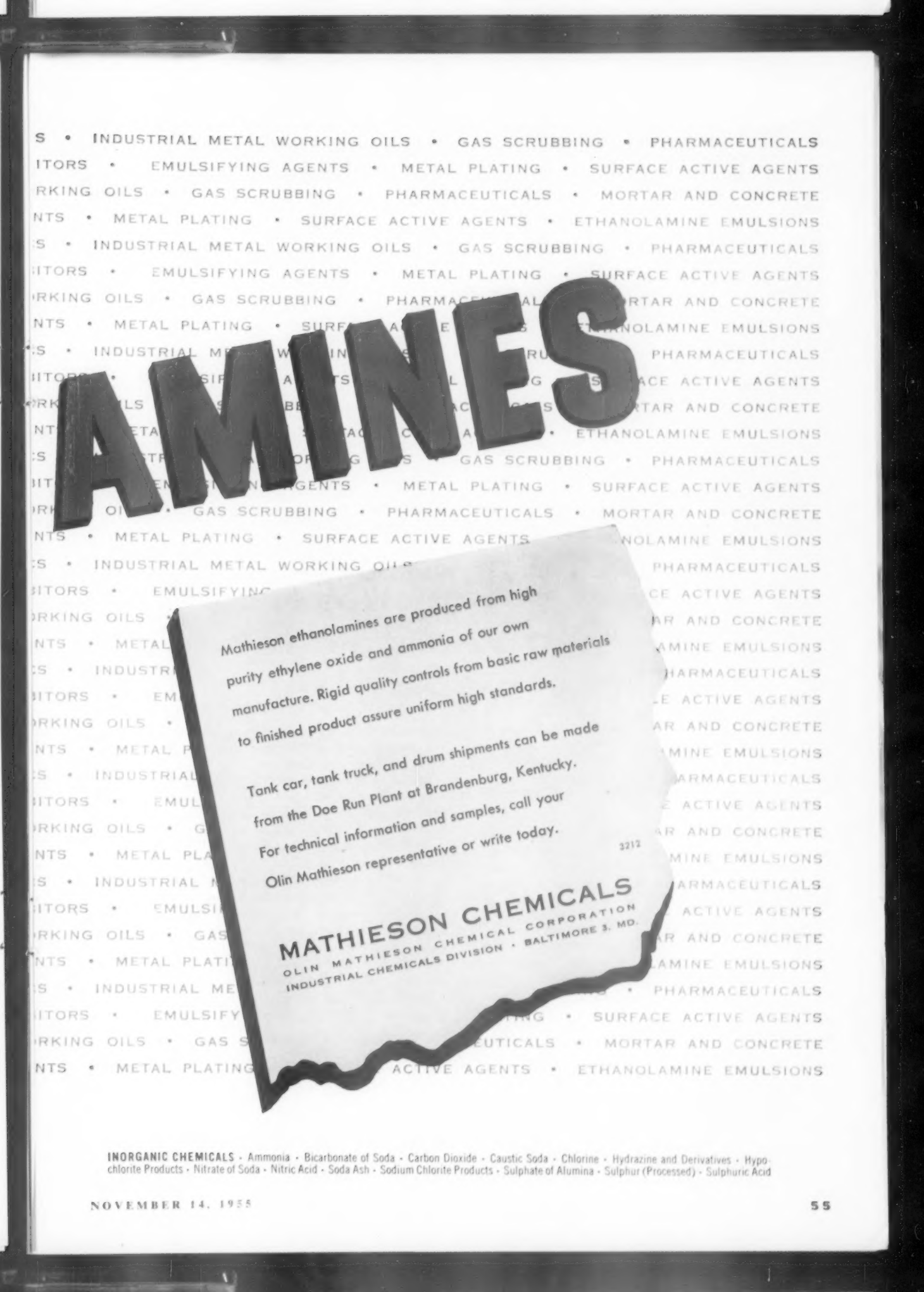
SURFACE ACTIVE AGENTS • ETHANOLAMINE EMULSIONS • TEXTILES • COSMETIC
MORTAR AND CONCRETE • LEATHER CLEANING • RUBBER • CORROSION INHIB
ETHANOLAMINE EMULSIONS • TEXTILES • COSMETICS • INDUSTRIAL METAL WO
LEATHER CLEANING • RUBBER • CORROSION INHIBITORS • EMULSIFYING AGE

MATHIESON

MONO
DI
TRI
ETHANOL

MATHIESON

ORGANIC CHEMICALS - Ethylene Oxide - Ethylene Glycols - Polyethylene Glycols - Glycol Ether Solvents - Ethylene Dichloride - Dichloroethylether
Formaldehyde - Methanol - Sodium Methylate - Hexamine - Ethylene Diamine - Polyamines - Ethanolamines - Trichlorophenol - Trichlorobenzene


AMINES
Mathieson ethanolamines are produced from high purity ethylene oxide and ammonia of our own manufacture. Rigid quality controls from basic raw materials to finished product assure uniform high standards.
Tank car, tank truck, and drum shipments can be made from the Doe Run Plant at Brandenburg, Kentucky.
For technical information and samples, call your Olin Mathieson representative or write today.
3212
MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.
INORGANIC CHEMICALS · Ammonia · Bicarbonate of Soda · Carbon Dioxide · Caustic Soda · Chlorine · Hydrazine and Derivatives · Hypochlorite Products · Nitrate of Soda · Nitric Acid · Soda Ash · Sodium Chlorite Products · Sulphate of Alumina · Sulphur (Processed) · Sulphuric Acid

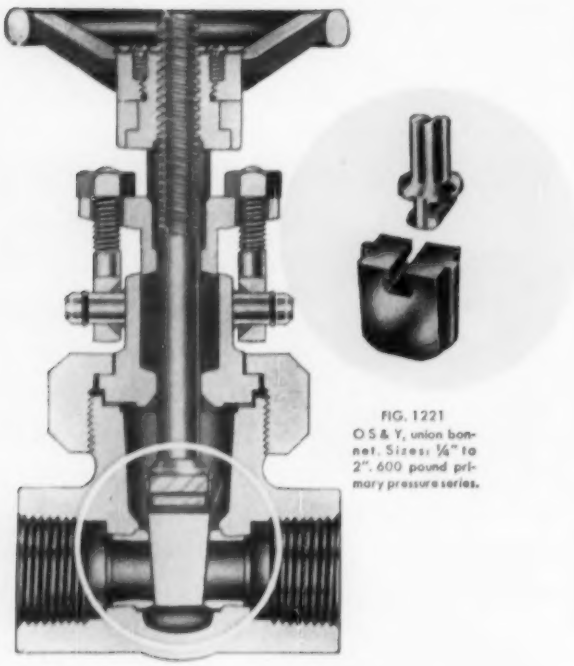


FIG. 1221
O S & Y, union bonnet. Sizes: ¼" to 2". 600 pound primary pressure series.

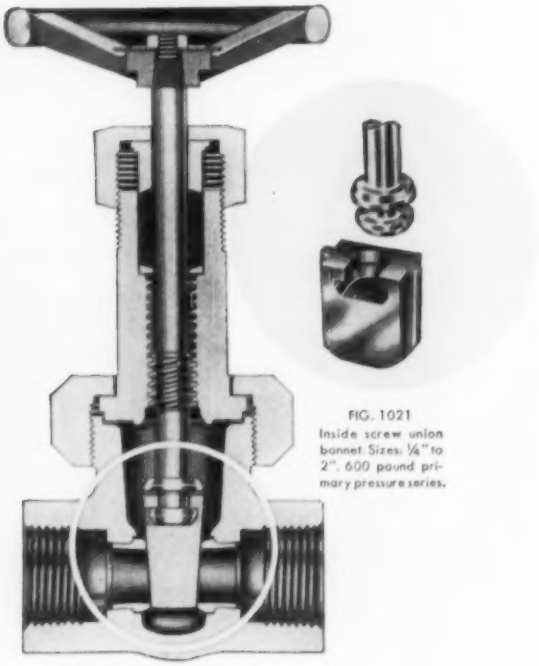


FIG. 1021
Inside screw union bonnet. Sizes: ¼" to 2". 600 pound primary pressure series.

New design makes OIC forged steel gate valves the most modern line . . .

NEW: stronger stem-to-wedge connection. Improved, modern design increases pull-out strength to many times the theoretical requirement. This design distributes the pull-out load more efficiently throughout the wedge structure to meet the most stringent specifications of valve buyers in all fields.

NEW: wedges wear longer. Wedges are made of 13% chrome stainless steel for corrosion resistance. They are duracased to at least 1000 Brinell Hardness to prevent galling and excessive wear caused by frequent closures upon foreign particles in the flow.

NEW: union bonnet design is more efficient. Body-to-bonnet joint of the male-female type provides a recess for the gasket. It is contained more securely, reducing the possibility of leakage or a blown gasket.

OTHER OUTSTANDING FEATURES

Stem threads of all OIC inside screw, forged steel valves are always contained inside the bonnet. They can't possibly load up with corrosive matter which might be in the flow. This keeps the threads clean and free running, and contributes to longer stem wear.

Modern OIC Seal-Ever packing is a special composition which eliminates electrolytic action between the stem and the packing. This prevents stem corrosion in the packing area and helps maintain a leakproof seal.

Back-seating feature provides means of repacking valves while in service.

OS & Y valve gland "I" bolts are retained on trunnions by modern, more efficient, stainless steel snap rings.

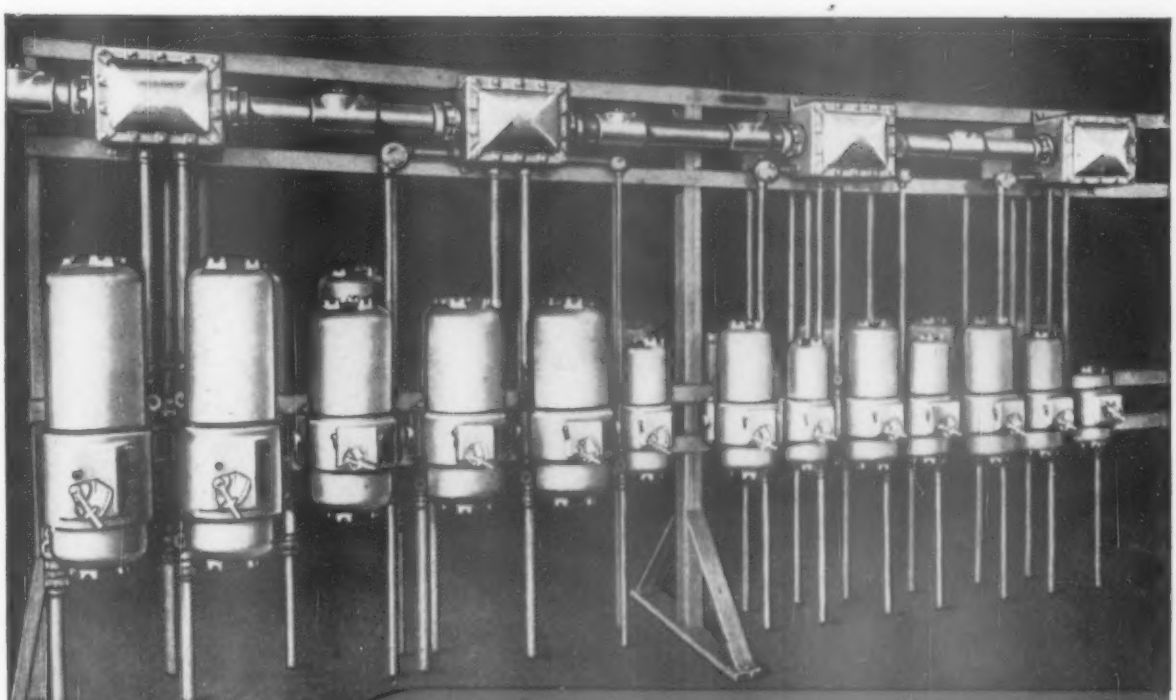
Shoulder-type seat rings are expanded into the body under heavy pressure. They are accurately machined to mate tightly with the wedge for a positive seal.

Order modern OIC Forged Steel Valves from your nearby OIC Distributor. Write and request Folder No. 195.

OIC Forged Steel Valves are also available in globes, angles and checks in a variety of trims for any service.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

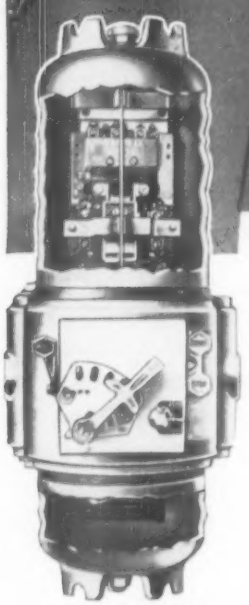
OIC FOUNDED 1883 VALVES | **FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON**



CROUSE-HINDS Type EPC

MOTOR STARTER and CIRCUIT BREAKER

Explosion-Proof CONDULETS* are compact!



Type EPC Combination Line Starter Conduit with Broken-Away Covers Showing Interior Starter and Circuit Breaker Assembly

Little space required for a big installation

Crouse-Hinds exclusive vertical cylindrical design conserves horizontal space that is always at a premium, speeds up installing and wiring, and saves money on the construction of steel mounting racks.

- **Explosion-proof, dust-tight,** and **weather-resistant** (raintight).
- **Light-weight cast aluminum** — for easy installation and maintenance. No lifting equipment required. Saves time and money.
- **Flame-tight threaded joints** throughout — the type of construction that was pioneered by Crouse-Hinds. Covers are taper-threaded with seven threads for extra safety. Operating shafts and bushings are thread-in-thread construction.
- **Seven conduit entrances** — give you the choice of either vertical or horizontal "through feed", "U" at either top or bottom, "T", or "L" at either side or back. Saves money by simplifying installation. Large central body — for easy wiring.
- **Built-in push button stations** and built-in selector switch are available.
- **Versatile.** Wide selection of well known controls. Starter sizes 0 to 5. Circuit breakers 50 to 600-Amp. frame sizes.
- The Crouse-Hinds Type EPC advantages all add up to lower installed cost and lower maintenance cost.

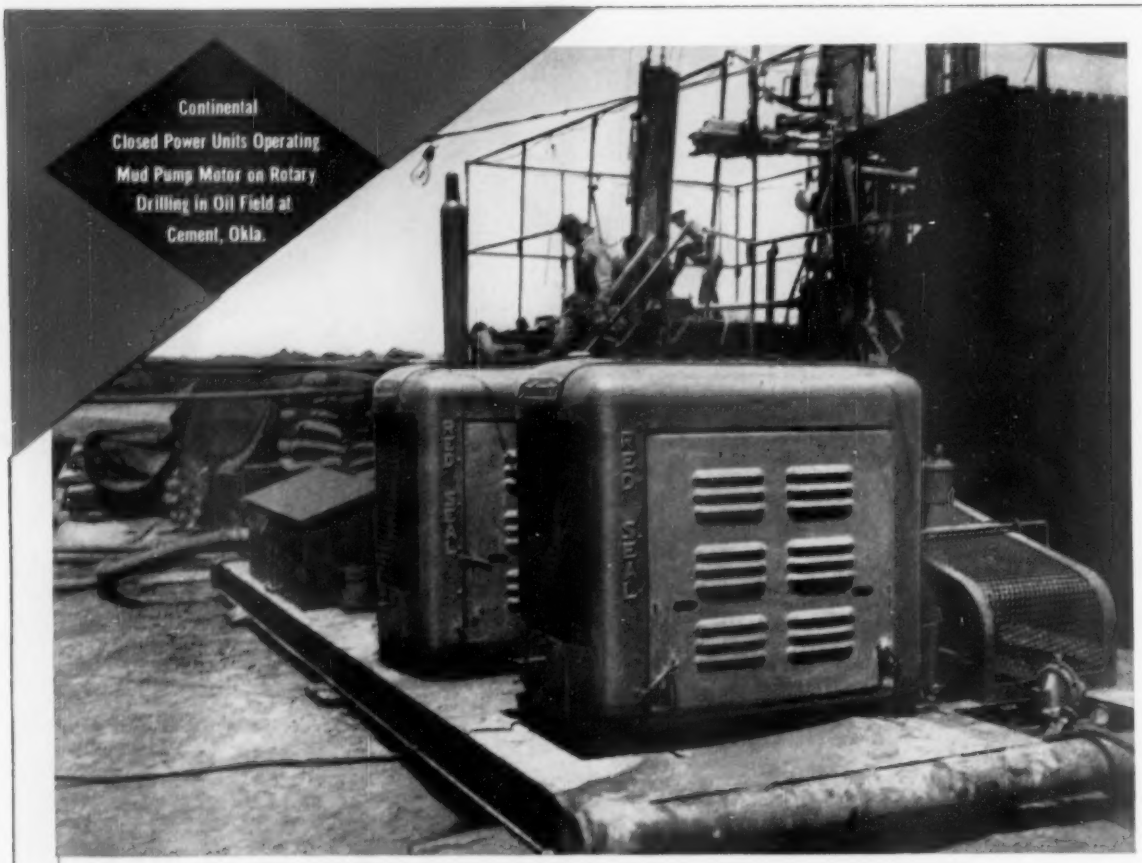
*CONDULETS are made only by CROUSE-HINDS

A Nationwide Distribution Through Electrical Distributors

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Amarillo — Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Memphis — Milwaukee — New Orleans — New York — Philadelphia — Pittsburgh — Portland Ore. — San Francisco — Seattle — St. Louis — St. Paul — Tulsa — Washington
RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Charlotte — Chattanooga — Corpus Christi — Fresno, Fla. — Richmond, Va. — Shreveport
Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS



CONTINENTAL RED SEALS
Run for Years and Years

Throughout the oil fields—in all types of installations—you'll find proof of the stamina that has made Continentals first choice for so many tough jobs. Many of them older than the units shown above are still turning in their full work quota, week in and week out, year in and year out—and, many of them under the least favorable operating conditions. Today's line of Continental Red Seal engines is up-to-the-minute mechanically, as well as broader and more diversified than ever before. There are Red Seal models engineered to the specialized needs of practically every oil field application—models at closely-spaced levels—14 to 240 horsepower—for use on all standard fuels. And, you may be sure of one thing: no other engine built today will give longer service, with less time out, than the Red Seal model engineered and built for your job.

Continental Motors Corporation

MUSKEGON MICHIGAN

Powerful as the Nation's

FACTORY-AUTHORIZED SERVICE AND GENUINE RED SEAL PARTS ARE AVAILABLE EVERYWHERE

6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 910 SOUTH BOSTON STREET, ROOM 1008, TULSA, OKLAHOMA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA

helpful refinery service that pays for itself!

TRETOLITE DESALTING

is used to desalt over one and one-half million barrels of crude oil daily. Salt removals are in the range of 95 to 100%, with chemical costs averaging around 2 mills per barrel. Regardless of the capacity requirement, Tretolite desalting offers a simple, flexible and economical answer.

OTHER TRETOLITE PRODUCTS AND SERVICES FOR REFINERS

Water Clarification Compounds
Demulsifiers for Waste Oil Emulsions
Demulsifiers for Doctor Treating
Anti-Foam Compounds
Asphalt Anti-Stripping Additives

KONTOL Corrosion Inhibitors

protect internal metal surfaces by forming a protective mono-molecular film. They also offer excellent detergent properties which assure the advantages of operations with clean units. Kontol inhibitors are available in numerous formulas, suitable for use in the various corrosive environments encountered in the refinery.

For complete information, ask your Tretolite refinery service engineer or write to

TRETOLITE COMPANY
A DIVISION OF PETROLITE CORPORATION
369 Marshall Avenue, St. Louis 19, Missouri
5515 Telegraph Road, Los Angeles 22, California

AR 559

announcing a new line of **small-size easy-to-read** gauges and receivers

NEW **REPUBLIC V5 GAUGES**

Individual, Independent Measuring Units for
DRAFT • PRESSURE AND VACUUM • DIFFERENTIAL PRESSURE • TEMPERATURE
High Accuracy Receivers for Pnuematic Transmitters and Electric Meters Measuring
FLOW • PRESSURE • CO_2 • DENSITY • LIQUID LEVEL • OTHER PROCESS VARIABLES

Important Features

- FIVE INCH ILLUMINATED SCALES
- INDEPENDENT, INTERCHANGEABLE UNITS
- MULTIPLE OR INDIVIDUAL MOUNTING — from one to eight units to a single case
- EASILY MOUNTED—no panel drilling necessary in most cases
- SCALES EASILY CHANGED OR COLOR-CODED
- POINTER MOTION REVERSIBLE
- SIMPLIFIED CONNECTIONS AT BACK OF CASE
- REMOVAL FROM FRONT OR BACK

Now you don't have to sacrifice instrument performance and readability to size considerations. With Republic's new line of small-size V5 Gauges, you can save panel space, make more compact instrument groupings and *still* get the accuracy, sensitivity and readability you would expect from conventional sized instruments. Full sized diaphragms, bellows and helix units in V5 Gauges assure "big" gauge performance in an instrument that requires only one-fourth the panel space of conventional gauges. Five inch scales are almost flat and are indirectly illuminated as a standard feature for easy reading — even from a distance.

● ***Write for New V5 Bulletin*** ▶

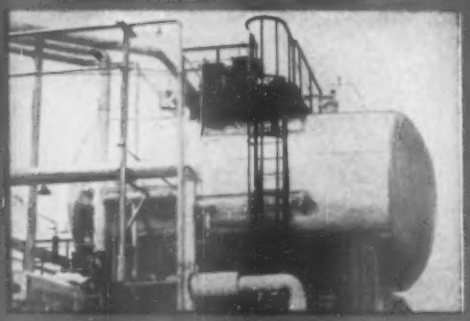
REPUBLIC FLOW METERS CO.

2240 Diversey Pkwy., Chicago 47, Illinois

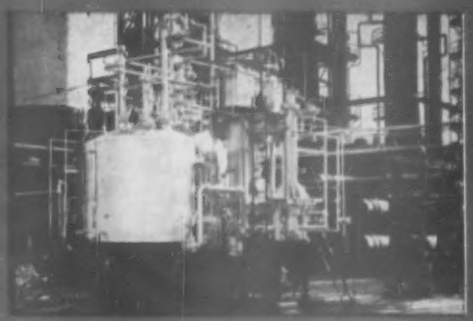
get higher profits, lower operating costs, reduced maintenance, better space use with

PETRECO®

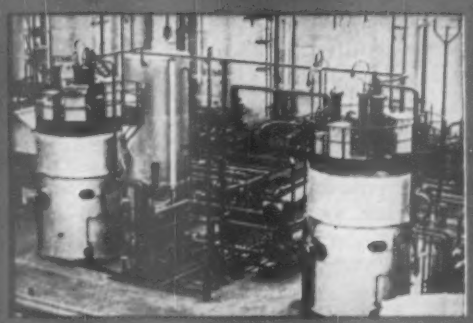
ELECTRIC PROCESSING



Petreco pioneered electric desalting and is the recognized leader in the field. Petreco offers a wide choice of desalting plant design, horizontal, vertical or spherical, all equally efficient.



Petreco distillate treating offers refiners an improved method for acid-contacting, caustic-scrubbing or doctor-treating. This new process is compact, continuous and automatic.



Petreco lube oil treating provides continuous, automatically-controlled acid treatment for lubricating oil and similar stocks. Operating in a closed system, it saves time, acid, space and guesswork.

Petreco desaponification removes ash-forming free caustic or sodium naphthenate soaps from heavy fuel stocks, enabling them to be marketed advantageously or used as a cracking charge.

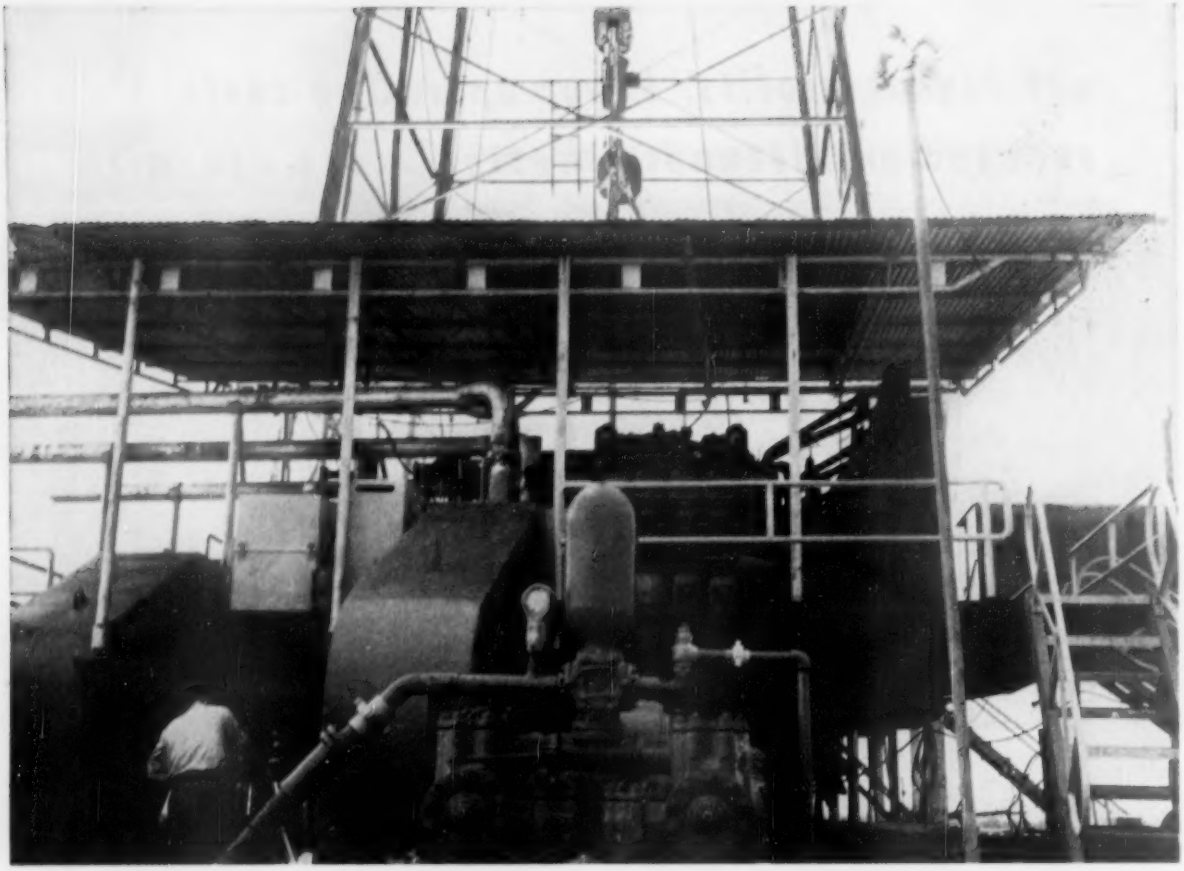
For complete information, write or call

PETRECO

A DIVISION OF PETROLITE CORPORATION

3202 South Wayside Drive, Houston 1, Texas • 1390 East Burnett Street, Long Beach 6, California

AR-2



Deephole Drilling . . . In a Hurry !

. . . the acceleration, lugging power, and dependability you get from Le Roi L3460 and L4000 engines mean faster round trips and lower drilling costs.

WHEN you have to go deep you need plenty of horsepower. And the place to get it is from Le Roi's L3460 with 600 max. hp. or its big brother, the L4000 with 655 max. hp.

You get much more, too. You get compactness. These V-12 overhead-valve engines are only 164 in. long. That makes them ideal for drill-rig installation, because they pack a lot of power in a small space — give you more horsepower per dollar.

But that's not all you get from these high-output engines. They represent the first, truly new design concept in 15 years. They have improved fuel economy; integral crankcase and cylinder construction for greater rigidity; longer bearing life; hydraulic valve lifters; better manifolding; husky crankshaft with integrally forged counterweights for unbelievably smooth operation — modern features that mean lightning response to load demands, outstanding performance and dependability.

Like all Le Roi engines, they're built to stand oilfield handling; they're easy to service; they have a wide speed range up to 1350 rpm; and they operate on natural gas, butane, or gasoline.

Ask your supply house or Le Roi distributor to show you an L3460 or L4000 at work. See for yourself why they can help you make hole faster. Literature is also available — just write us for it.

P-139

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

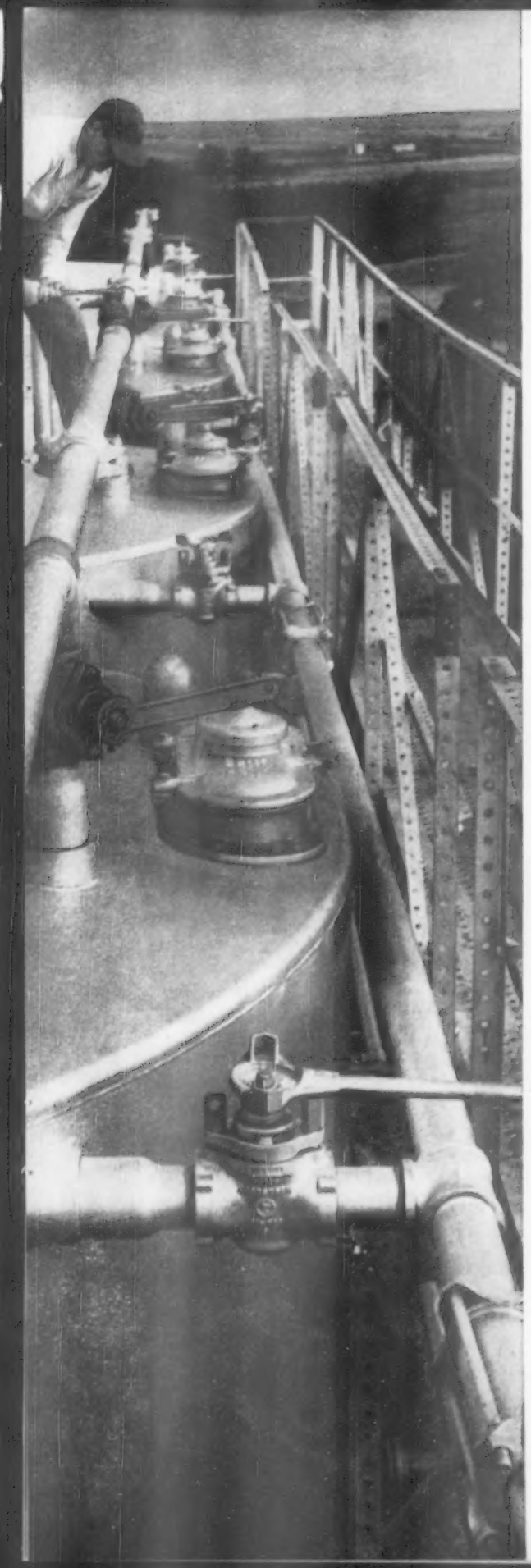
PORTABLE AIR COMPRESSORS

TRACTAIR

STATIONARY AIR COMPRESSORS

AIR TOOLS

ENGINES



Put New Profits in Production with Rockwell-Nordstrom Valves

Valves are always a vital part of the investment in any petroleum installation. Valve efficiency is a very important item in determining profits on *your* operations.

For year-in, year-out dependability, efficiency and economy, you can't buy a better valve than Rockwell-Nordstrom, *the original lubricated plug valve.* Pressurized lubrication keeps repair and replacement costs down by eliminating metal-to-metal wearing friction and protecting the working surfaces against corrosive-erosive line material. Leakproof lubricant sealing eliminates costly, dangerous leakage. Rugged construction insures against expensive down time.

Whatever your valve requirements, there is a Rockwell-Nordstrom valve that will do the job better, more dependably and economically. Find out how Rockwell-Nordstrom valves can put new profits in *your* production. Write: Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-
Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

KELLOGG
Sinclair-Baker
Reforming

Dark Horse in the Reformate Race...

New Process and New Catalyst Promise New Records in Production of Low Cost, High Octane Reformates

Although the M.W. Kellogg, Sinclair-Baker process is still too new in service to provide any long-term performance data, and customers' initial findings cannot yet be disclosed, many economic advantages of this catalytic naphtha reforming process have already been firmly established. Any refiner faced with increasing octane yields from present feedstocks, or with getting high octane reformates from lower grade naphthas, will recognize the significance of the following points . . .

Quick Start-Up

Experimental operation is reduced to a minimum. One M. W. Kellogg reforming unit was started on its final test run within two weeks after the catalyst was first charged to the reactors—with octane rating and yield during this 15-day period well in excess of the guarantee.

A Regenerative Catalyst

Sinclair-Baker Platinum Catalyst RD-150 can be regenerated easily and quickly *in situ* to provide many operating cycles, each of many months duration, with negligible loss in catalyst activity. Cost of catalyst per pound in terms of barrels of reformate produced is a major economic factor of the process.

Long Catalyst Life

Sinclair-Baker regenerative catalyst RD-150 has high activity and long initial life. It has been in operation for over one year without supplementing the catalyst. 95 octane reformate can be produced for six months or longer before regeneration is required.

Octane Level

Depending on the feedstock, clear octane ratings above 90 are now being obtained commercially—with 100, and even better, a goal that is entirely feasible and economically practical. *Variability* of octane rating is the keynote of the process, permitting selection of the exact processing conditions for a given naphtha to secure optimum economic operation at all times.

Supply of Catalyst

Use of the process does not obligate refiners to buy Catalyst RD-150 beyond the first year's requirements, although a continuing source of supply can be assured. This freedom from long-term purchase and license agreements is an important consideration when deciding which is the most suitable reforming process.

Low Grade Naphtha Feeds

M. W. Kellogg's unique design permits the effective desulphurization of low grade naphthas as part of the process, and avoids corrosion and metal contamination. Kuwait naphthas thus treated, for example, can produce yields of high octane reformates only slightly lower than those for higher grade Mid-Continent feedstocks.

For More Information

Further details on M. W. Kellogg's catalytic naphtha reforming process, the Sinclair-Baker catalyst, together with some economics of both, are contained in a recent booklet, "Low Cost Production of 95 Octane Clear Reformate." Copy sent on request.

Refinery Process Division

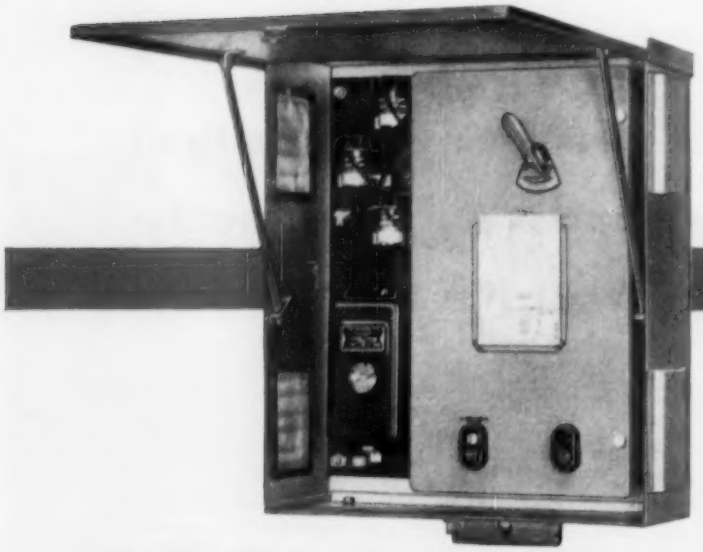
THE M. W. KELLOGG COMPANY

225 Broadway, New York 7, N. Y.

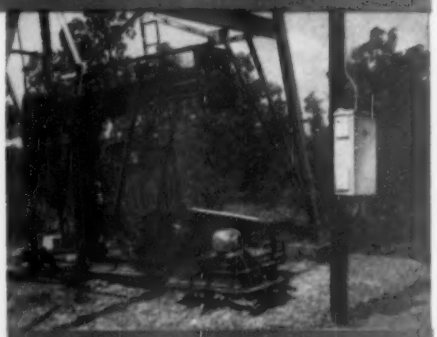
The Canadian Kellogg Company, Ltd., Toronto • Kellogg International Corp., London

SUBSIDIARIES OF PULLMAN INCORPORATED

Improved C-H Oil Well Pumping Control permits easy in-the-field modification to the type of restarting desired after power interruptions.



Grim, Okla.



Oil City, Tex.

Baytown, Tex.

STOP BUYING NEW STARTERS EVERY TIME YOUR NEEDS CHANGE

Get C-H Oil Well Pumping Control that makes it easy to modify restarting characteristics

There is no need to buy replacement starters every time you extend your oil well pumping operations. Cutler-Hammer Oil Well Pumping Control contains provisions that make it a simple matter to change from immediate restarting after a power failure, to manual restarting, or to automatic time-delay staggered restarting. The control panel now readily accepts either a C-H Undervoltage Relay or a C-H Time Delay Relay. Panel space is provided and a diagram inside the cover shows all circuit arrangements with leads numbered to permit easy wiring changes.

Here's how it works. If you are operating just a few wells the basic C-H Pumping Control automatically restarts pump motors just as soon as power is restored. But if you increase the number of wells operating, the combined restarting load of all pumps may become too heavy. Then you add C-H Undervoltage Relay and pumps are restarted manually, one at a time. But if your operations become so extensive as to prohibit manual restarting, you simply change to C-H Time Delay Relay that provides automatic staggered restarting. No need to buy new starters as your needs change. Just the simple, inexpensive addition of one relay or another, in space provided for the change.

This feature is in addition to aluminized enclosure that reflects sun rays and heat; screened and louvered ventilators that shut out dirt and pests; cool, dust-safe vertical contacts; finest program time-switch; full 3-phase overload protection; high torque clock motor; etc., etc., etc. The original oil country pumping control that has no equal. Insist on Cutler-Hammer and refuse all substitutes. CUTLER-HAMMER, Inc., 1453 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

CUTLER-HAMMER
MOTOR CONTROL
C-H

Cutler-Hammer Program Time Switch for scheduling of pumping cycle automatically. Day-omission feature available.

MEMBER AMERICAN PETROLEUM INSTITUTE

Sigma Welded Aluminum Tanks

—WEIGH LESS
—CARRY MORE
—LAST LONGER

The problem of how to get bigger pay-loads in truck trailers and semi-trailers was solved by one manufacturer who converted to weight-saving aluminum and sigma welding . . . These giant semi-trailer tanks hold 7,950 gal.—700 gal. more than similar tanks made of steel.

The high quality of sigma welded aluminum has increased tank resistance to corrosion. Sigma welding has also eliminated expensive weld cleaning—welds need only a light grinding and they are finished. Each semi-trailer requires about 1,100 linear ft. of sound sigma welding. The new high-strength, ductile alloys used range in thickness from 3/32 to 1/2 inch.

Like many other products throughout industry, these trailers are being fabricated with new quality and efficiency using sigma welding.

Here are some features of sigma welding—

- Uses any d.c. or constant potential power supply. With c.p. voltage is held constant—welding operations are fast and more efficient.
- Makes smooth welds in joints of all types—on all commercially welded metals . . . joins metals up to 1/4 in. thick in one pass.
- Sigma welding speeds exceed 100 in. per min. in many operations. Start saving now, call your local LINDE representative for more information—and ask for Form 7942 "Modern Methods of Joining Metals."

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation

Linde
Trade-Mark

GM DIESEL
CASE HISTORY NO. IID2B-5

OWNER: Rankin, Karper and Glass Drilling Company, Graham, Texas.

INSTALLATION: Two GM "Twin" 6-110 Diesels with torque converters. One drives Gardner-Denver 16" FXQ mud pump, other "Twin" drives Bethlehem S-55 draw works. Drilling to 9,000 feet. Firm owns three GM Diesel-powered rigs, one of which ran steadily for three years with no engine repairs.

PERFORMANCE: After 7 years' experience with GM Diesel power, Tool Pusher George Little says, "We know GM Diesel is the ideal power for our rigs. It is economical to operate, is backed by a good service operation, gives us fast round trips and freedom from downtime. In service over a year, these 6-110 Twins have given us the performance we expected."

"Gave us the performance we expected"

DRILLING contractors expect two things from their equipment: performance and reliability. Neither is worth much without the other. Rankin, Karper and Glass place the stamp of approval on General Motors Diesel engines because they have "measured up."

Have you seen the latest General Motors oil field engines—the flexible General Motors Twin 6-110 Diesel torque converter units, a pair of which this firm has operated steadily for over a year? Each Twin gives 420 continuous horsepower without super-charging, weighs only 12,200 lbs., is 87" high, 60" wide, 123" long. They fit existing compounding case centers. They use no clutches, are "declutched" by "dumping" type converters.

Yet with all these advantages—smooth, rig-saving torque converter power, low maintenance, and a good service organization—the GM Twin 6-110 Diesels cost less than comparable engines *without* torque converters. Get full details from your General Motors Diesel distributor or supply company.

It Pays to Standardize on

GM
GENERAL MOTORS
DIESEL POWER

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 30 to 300 H. P. Multiple Units . . . Up to 893 H. P.

GENERAL MOTORS CORP., DIESEL ENGINE SALES, PETROLEUM INDUSTRY, 1504 PHILTOWER BLDG., TULSA, OKLAHOMA

ALABAMA—
Albertville, Birmingham, Montgomery
ARMSTRONG EQUIPMENT CO.

CALIFORNIA—Bakersfield
LAWLESS BROTHERS, INC.
Berkeley
WEST COAST ENGINE & EQUIPMENT CO.
El Cajon
DEAKINS-LANE DIESEL CO.
Los Angeles
ANDERSON-O'BRIEN CO.
Ventura
GEM EQUIPMENT CO.

COLORADO—Denver
THE COLORADO BUILDERS' SUPPLY CO.
Fort Morgan
D & H DIESEL POWER, INC.

ILLINOIS—Mt. Carmel
WESTERN SERVICES

KANSAS—Great Bend, Wichita
DIESEL EQUIPMENT CO.

LOUISIANA—Alexandria
UNITED TOOL CO.
Harvey
GEORGE ENGINE CO., INC.
Shreveport
UNITED TOOL CO.

MICHIGAN—Detroit, Grand Rapids
EARLE EQUIPMENT CO.

MISSISSIPPI—Jackson
TAYLOR MACHINERY CORP.

MISSOURI—St. Louis
WESTERN MACHINERY & ENGINE CO.

NEW MEXICO—Albuquerque
HARRY CORNELIUS CO.

NORTH DAKOTA—Williston
SWEENEY BROTHERS

OKLAHOMA CITY—Oklahoma City, Tulsa
DIESEL POWER CO.

TEXAS—Corpus Christi, Dallas, Houston, Lubbock, Odessa, San Juan
STEWART & STEVENSON SERVICES, INC.
Plainview
DIESEL POWER, INC.

UTAH—Moab, Salt Lake City
CATE EQUIPMENT CO., INC.

WYOMING—North Casper
WESTERN OIL TOOL & MFG. CO., INC.

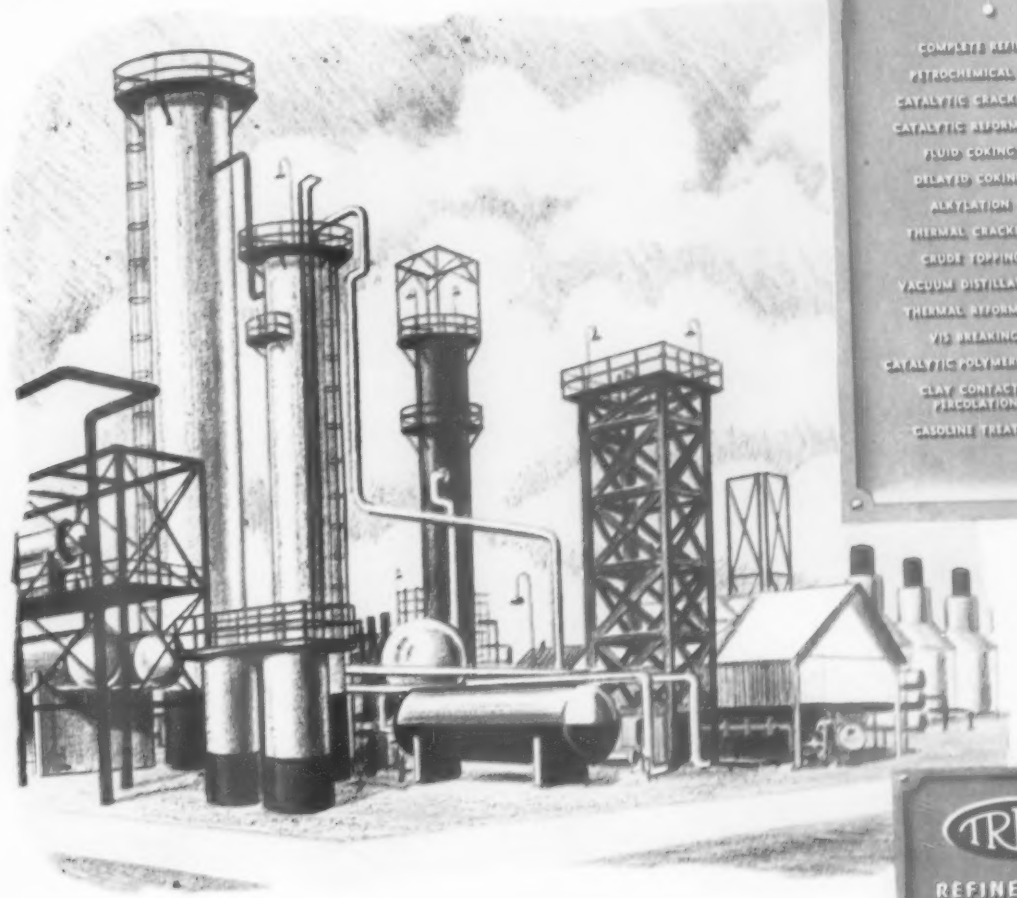
IN CANADA—Distributors in all key locations, under
GENERAL MOTORS DIESEL, LTD.
London, Ontario

OFFERING *Complete* PETROLEUM REFINERY AND CHEMICAL PLANT DESIGN AND CONSTRUCTION SERVICES . . . .

TRECO

TRECO DESIGNS, ENGINEERS AND CONSTRUCTS

- COMPLETE REFINERIES
- PETROCHEMICAL PLANTS
- CATALYTIC CRACKING UNITS
- CATALYTIC REFORMING UNITS
- FLUID COKING UNITS
- DELAYED COKING UNITS
- ALKYLATION UNITS
- THERMAL CRACKING UNITS
- CRUDE TOPPING UNITS
- VACUUM DISTILLATION UNITS
- THERMAL REFORMING UNITS
- VIS BREAKING UNITS
- CATALYTIC POLYMERIZATION UNITS
- CLAY CONTACTING AND PERCOLATION UNITS
- GASOLINE TREATING UNITS



TRECO

REFINERY AND PETRO-CHEMICAL PLANT

DESIGN ENGINEERING CONSTRUCTION

REFINERY ENGINEERING CO.
TULSA TORONTO

Over the years, we have repeatedly demonstrated our ability to efficiently serve our customers on their consulting, estimating, design and construction problems. Our experience enables us to complete a project, well-engineered, and on schedule, at a minimum cost.

Nearly all former customers have complimented us by giving us additional contracts.

TRECO

REFINERY ENGINEERING *Company*

TULSA TORONTO

NEW Mack B-80 SERIES—

a money-making giant for heavy oil field work

New features make this rugged six-wheeler more powerful, sturdier . . . and a greater work producer than even its great Mack predecessors!

GREATER DIESEL POWER. Mack's famous Thermodyne® Diesel is now turbo-charged to 205 h.p.; other turbo-charged diesel power up to 262 h.p. is available.

MORE BRAKING POWER. Mack Thermodyne Diesel engines are recognized as having more braking power than any other. Now new exhaust brakes increase their retardation by 50%, while adding greatly to brake lining life.

NEW TRANSMISSIONS. From 10 to 20 speeds, with a wide range of options of final drive ratios to meet any operating conditions. Complete one-box units—no auxiliary transmissions or two-speed axles are necessary.

SQUARE-CUT MILITARY FENDERS. Make the Mack B-80 series look even more like the sturdy work-champions they are! Functional too—they provide strong, steady working platforms.

IMPROVED MACK BALANCED BOGIE. Assures positive traction no matter what the load or terrain. Mack's exclusive Power Divider delivers torque to each wheel in proportion to its traction, eliminating useless wheel slippage and spinning.

UNITIZED CABS. Roomier, stronger, thoroughly ventilated Mack "B" cabs are more comfortable and fully accessible. "Unitized" construction—radiator, fenders and cab mounted as integral unit at 4 points—means longer cab life, greater stability.

FULL RANGE. 11 models to choose from, giving you a complete selection of sizes and capacities to meet your own needs exactly.

You get *more* power—*greater reserve* power—to pull through with any load, on the tightest schedules when you put new Mack B-80's on your jobs. And you get all the features that you need for top efficiency and performance in the field, too! For the full story, see your Mack branch or distributor.

3471

MACK TRUCKS **Empire State Building, New York 1, N. Y.**

A REAL 1yd. RIG

for the pipeline and refinery

THE NORTHWEST Model 41 is built as a full 1 yd. Crane from the ground up. It brings you all the Northwest advantages and is fully convertible from Shovel to Crane, Dragline or Pullshovel. If you need a full 1 yd. machine, capable of delivering the service you have a right to expect from a 1 yd. rig, be sure to get full details on the Model 41 before you buy.

NORTHWEST ENGINEERING COMPANY
1517 Field Bldg., 135 South LaSalle St.
Chicago 3, Illinois

MODEL 41

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

NORTHWEST ENGINEERING COMPANY
135 South LaSalle Street, Chicago 3, Illinois

Please send me complete information and catalogs on equipment as checked:

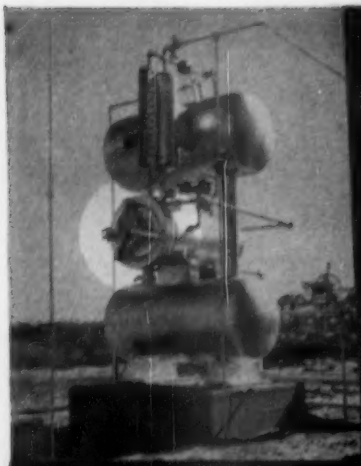
☐ Shovel ☐ Crane ☐ Dragline ☐ Pullshovel
☐ Truck Crane Capacity_____

Name_____

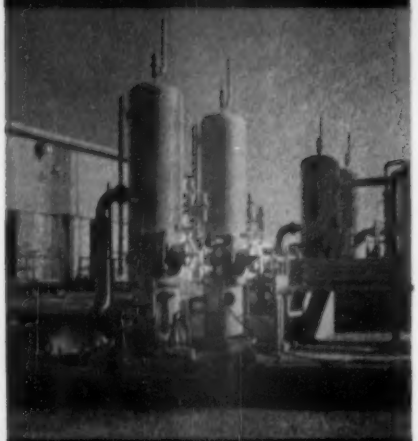
Address_____

Town_____ Zone____ State____

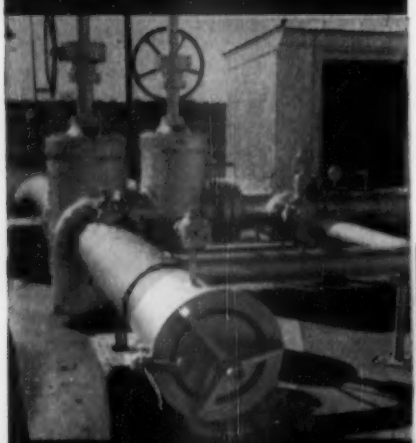
Signed_____



It's no effort at all to reach the internals of this Peerless Gas Odorizer through the Sillers Flex-Ring Closure.

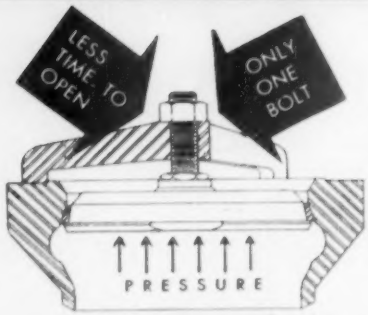


Sillers Flex Ring Closures are utilized on these large scrubbers at a Field Processing Plant in South Texas.



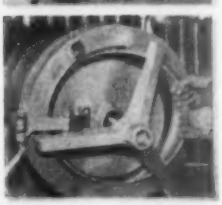
Here is a typical Sillers Flex Ring Closure installation on a Sillers Scraper trap on a products pipeline in Eastern Oklahoma.

Faster than ever before... SILLERS FLEX RING CLOSURES



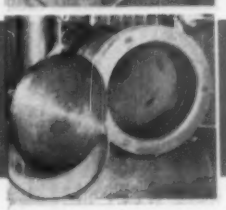
NEW, EASY SILLERS WAY

The Perfect Closure for Boilers, Evaporators, Heat Exchangers, Autoclaves, Filters, Strainers, Absorbers and all types of Pressure Vessels and Piping Systems.



SILLERS FLEX RING CLOSURES give you many advantages and economies over the conventional flange type of closure, making the Sillers Closures about the most outstanding closure for the industry. LOW INITIAL COST . . . LESS TIME FOR OPENING AND CLOSING (JUST ONE BOLT) . . . TIGHTER SEALS AT HIGH PRESSURES . . . LESS WEIGHT . . . EASE OF HANDLING . . . and NO SEAL DESTRUCTION IN CASE OF FIRE, are just a few of the many advantages and features of the SILLERS FLEX RING CLOSURES. Sillers Closures are available in all standard sizes and can quickly be adapted for special applications.

Send for Bulletin No. 3900
for Completely Illustrated Details



SILLERS ENGINEERING COMPANY

Division of Peerless Manufacturing Co.
BOX 13165 DALLAS, TEXAS

Representatives in Principal Cities

(1). Flex Ring Unit assembled as in service. (2). Spider released, gasket being removed. (3). After gasket is removed, plug is rotated to open. (4). Unit completely opened and in a fraction of time taken for conventional type closures.

Report on the 15 cu. ft. MICHIGAN 12B:

New Tractor Shovel features power-shifting, twenty per cent more weight and power

Heavier and more powerful than comparable machines, and infinitely easier to operate—that's the new MICHIGAN 12B. There's no clutch pedal or engine clutch on the 12B: Clark's power-shift transmission completely eliminates this notorious cause of excessive maintenance and down time. From the cutting edge of the 15 cu. ft. bucket to the flywheel of the 44 or 42 horsepower engine (gas or diesel), the MICHIGAN 12B is simply *more* machine.

20% more weight and power. At 6250 lbs. (6350 lbs. diesel), the 12B is 20% heavier than most machines in its class. With 44 or 42 horsepower, gas or diesel, it is 20% more powerful. This margin of weight and power, plus bucket break-out action, enables the 12B to dig its way into material where other machines merely spin their wheels. The 12B's extra weight, low center of gravity and low-level bucket carry-position contribute to its superior stability: you can handle maximum loads safely and fast within its short turning radius.

Instant power-shifting. Engine torque is multiplied up to 300% by the Clark torque converter—automatic torque build-up as you meet tighter, tougher materials. To shift between High, Low or Reverse, simply push the single power-shift lever to the desired position. Hydraulic power in the constant mesh power-shift transmission makes any shift instantly, even when travelling. There's no clutch pedal, no engine clutch, no gear clash. And as any operator will tell you, *it sure beats riding a heavy clutch all day!*

Complete dust protection. The 12B is protected against dust and dirt in every conceivable way. An oil bath air cleaner filters the air which enters the main hydraulic reservoir. There is a filter for the torque converter oil and the power-shift transmission oil. A partial flow filter protects the engine lube oil. Transmission, torque converter, starting motor and generator are all dust-sealed. On the 12B, every precaution has been taken to avoid dust problems.

Make your own comparison. Neither words nor specifications can indicate the working superiority of the new MICHIGAN 12B. You've got to see it in action—see it handling your toughest job. Call your local MICHIGAN distributor or write us direct to arrange an on-the-job demonstration. The new 12B is available on a low cost, no-down-payment Lease Plan—ask for details. Whether you lease or buy the 12B, it will pay for itself faster than any Tractor Shovel you've ever seen. See it!

MICHIGAN is a trade-mark of Clark Equipment Co.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
448 Second Street
Benton Harbor 36, Michigan

WAUKESHAS LRZB'S Power

Durham's new Ideco

Super 7-11

When Durham Drilling Co. installed its new Ideco Super 7-11 rotary drilling unit three Waukesha engines were chosen to provide dependable, economical power. And like every Waukesha engine in the field, these engines are backed up by Waukesha Sales & Service, Inc.

Waukesha Sales & Service has branches throughout Texas, Louisiana and New Mexico located close to the heart of oil activity to provide prompt service and prevent losses from unnecessary down-time. Waukesha Sales & Service, Inc. has the experience and the facilities to give your Waukesha engine the service it needs to stay in first class condition.

WAUKESHA

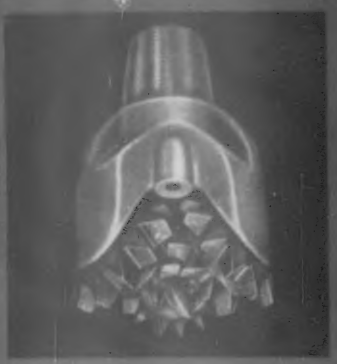
Sales & Service, Inc.

1422 MAURY ST. • HOUSTON, TEXAS

EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, NORTH AND WESTERN LOUISIANA, SOUTHERN ARKANSAS AND NEW MEXICO

WORLD'S LARGEST DISTRIBUTOR OF OIL FIELD ENGINES

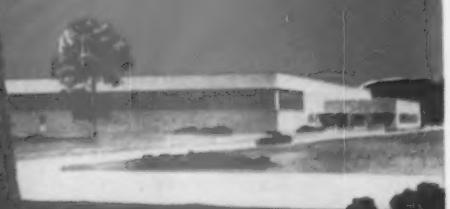
Rugged Chicago Pneumatic Three Cone Rock Bits are designed to afford deep penetrating action with every turn of the drill stem. Their fast cutting speed enables you to drill more feet a day no matter what the formation. They're available in seven different types for soft to hard and abrasive formations.



Oil Tool Division,
Chicago Pneumatic Tool Co.,
5000 U. S. Highway 81 South,
Fort Worth, Texas.

Chicago Pneumatic

GENERAL OFFICES: 8 East 44th Street, New York 17, N. Y.
IN CANADA: 10103 81st Av., So. Edmonton, Alberta, Canada.
IN MEXICO: D. R., Reseo Morena No. 41, Mexico City, D. F., Mexico.
PETROLEUM MACHINERY CORPORATION, 30 Rockefeller Plaza, N. Y. 20, N. Y.
(Export Agent, exclusive of Mexico and Canada).



THREE CONE BITS • REAMING BITS • REAMERS • DRILL COLLARS • TOOL JOINTS • SUBS • JUNK BASKETS

IT'S MORE THAN A SIGN OF QUALITY

it's a symbol of over 20 years' service to the gas-treating industry

MONOETHANOLAMINE
DIETHANOLAMINE 〉 **for H_2S and CO_2 removal**

DIETHYLENE GLYCOL
TRIETHYLENE GLYCOL 〉 **for H_2O removal**

Yes, you get more than the best gas-treating chemicals at CARBIDE. You also get these *extra* benefits.

- the services of CARBIDE technical representatives.
- laboratories that devote a great deal of time to advancing knowledge in this field.
- the "know-how" accumulated over more than twenty years by the first producer of these chemicals.
- a national distribution network of 49 warehouses and 14 bulk storage depots to assure you of continuous supply and rapid delivery. Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

CARBIDE and CARBON CHEMICALS COMPANY

A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, New York
Offices in Principal Cities

IN THE OIL INDUSTRY, TORRINGTON *Bearings are used in many applications including slush pumps, rotary tables, draw works, blocks, swivels and pumping units.*

Courtesy of the Ohio Oil Co.

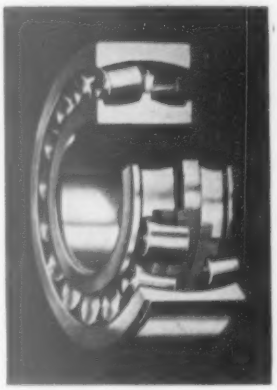
TORRINGTON Spherical Roller Bearings

are designed with machined, cast-bronze, land-riding cages—one for each path of rollers—to assure true rolling operation

Other TORRINGTON SPHERICAL ROLLER BEARING features are equally important in assuring top performance. Contact surfaces are precision ground for even load distribution, long bearing life. Rollers and races are carefully heat treated to give maximum resistance to shock and wear.

An integral center flange gives positive radial stability and accurate positioning of thrust loads—an essential factor for longer service life. Contact surfaces possess geometrical conformity, giving ultimate load carrying capacity.

These are reasons why TORRINGTON SPHERICAL ROLLER BEARINGS give you long, low-maintenance service in the toughest, heavy-duty applications. Get the most for your bearing dollar—specify TORRINGTON.



THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON SPHERICAL ROLLER BEARINGS

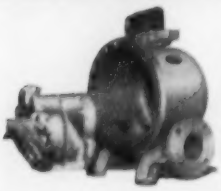
Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

HIGH MAINTAINED ACCURACY

...and LOW MAINTENANCE COST

are the direct result of this exclusive combination of fully

BALANCED PERFORMANCE FEATURES



DOUBLE CASE CONSTRUCTION protects measuring unit from distortion of piping strains, surges, or external damage.

TWO MOVING PARTS in the measuring chamber, with no metal-to-metal contact.

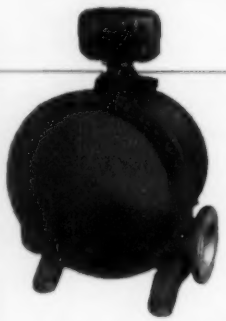
COMPLETE STATIC AND DYNAMIC BALANCE of true rotary operation eliminates vibration — no reciprocating parts or vanes.

ONLY 4 UNIT-BUILT ASSEMBLIES for quick, easy inspection or replacement without disturbing line connections.

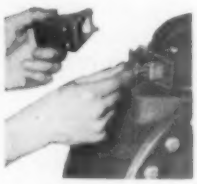
LARGE ROTOR BEARINGS assure long service life with no measurable wear, and less maintenance.

FULLY SELF-LUBRICATED measuring element requires no servicing or attention.

There's a Brodie Bi-Rotor Meter for every petroleum metering requirement — capacities up to 1300 gpm, pressures to 1250 psi.



SIMPLE DRY ADJUSTMENT in exact increments of 5/100 of 1% — while meter is in operation.



BRODIE ALL-STEEL BiRotor TRUE-ROTARY METERS

RALPH N. BRODIE COMPANY · San Leandro, California, U.S.A.

MT. VERNON, N. Y. 550 So. Columbus Ave. | DALLAS 2, TEXAS 167 Parkhouse St. | CHICAGO OFFICE: 1227 Circle Ave., Forest Park, Ill. | SEATTLE 9, WASH. 221 9th Ave. N. | LOS ANGELES 22, CALIF. 5401 E. Sheila Street

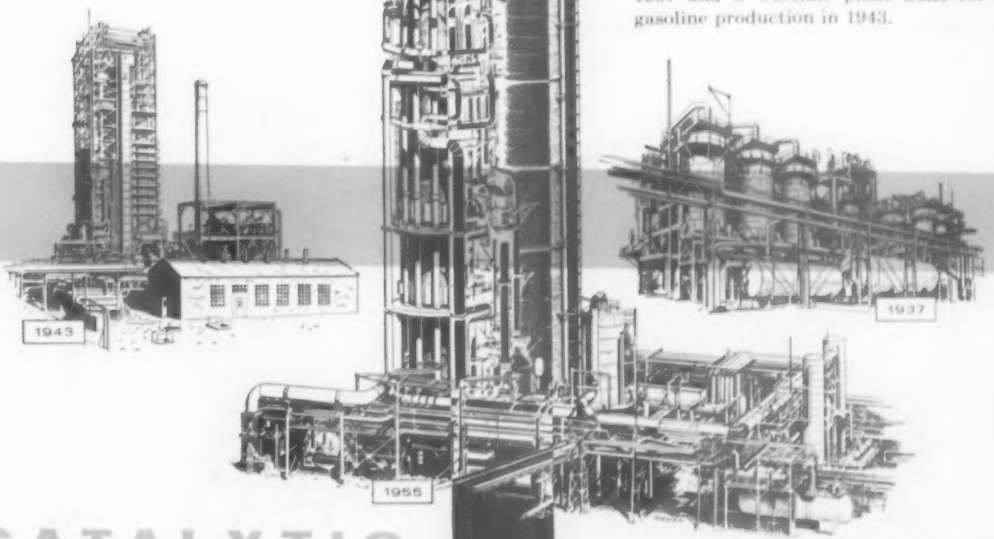
REPRESENTATIVES WITH STOCKS AND SERVICE FACILITIES IN ALL PRINCIPAL CITIES

THE EYE OF TIME

"THE EYE OF TIME"
jeweled timepiece by Salvador Dali,
shown by permission of
The Cotherwood Foundation,
Bryn Mawr, Penna.

Through the decades, time's watchful eye has seen the steady development of new and mighty engineering achievements in the great Sun Oil Company refinery at Marcus Hook, Penna. . . . helping set the pace for the giant forward strides of America's petroleum industry.

During 1955, Catalytic Construction Company's complete petroleum engineering services have added the sixth catalytic cracking plant in this refinery, a towering Houdriflow unit. Pictured also are a Houdry Fixed Bed plant erected in 1937 and a wartime plant built for aviation gasoline production in 1943.



CATALYTIC construction company

1528 Walnut Street Philadelphia 2, Penna.

In Canada:
CATALYTIC CONSTRUCTION OF CANADA, Limited; Sarnia, Ontario

CATALYTIC *ON-TIME . . . ON-BUDGET* SERVICES

for the atomic energy, chemical, petrochemical, petroleum and metallurgical industries • Project Analysis • Process Design • Economic Studies • Engineering • Procurement • Construction • Plant Operation

NOW... a new and more powerful

HORSEPOWER INCREASED 25% IN HMAB

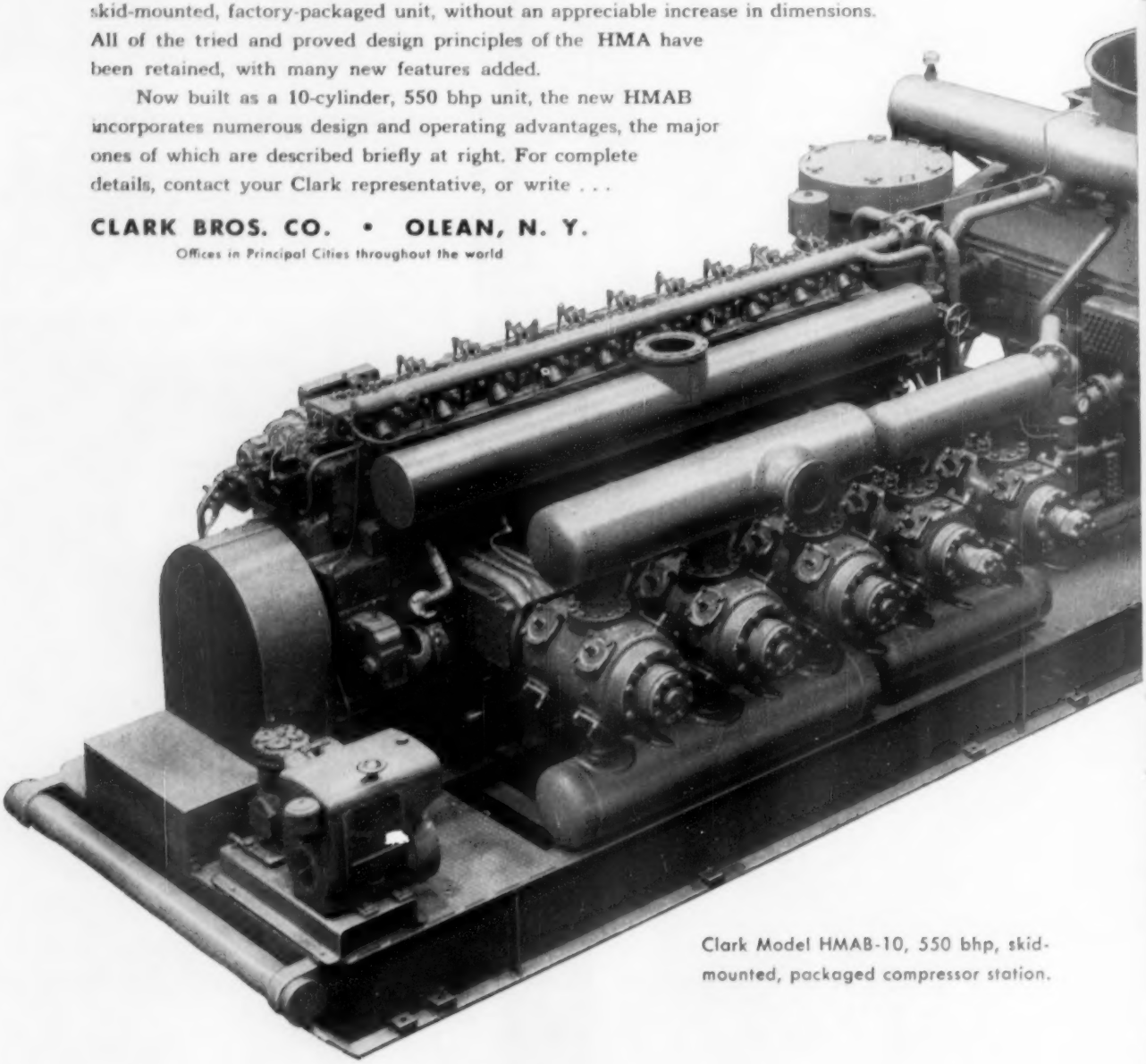
Out of the experience gained in more than 10 years of building hundreds of "Midget Angles" for field service, Clark has developed the new and more powerful HMAB.

It delivers 25% more horsepower than the famed Clark HMA line (which will continue to be built). It meets the need for a more powerful, skid-mounted, factory-packaged unit, without an appreciable increase in dimensions. All of the tried and proved design principles of the HMA have been retained, with many new features added.

Now built as a 10-cylinder, 550 bhp unit, the new HMAB incorporates numerous design and operating advantages, the major ones of which are described briefly at right. For complete details, contact your Clark representative, or write . . .

CLARK BROS. CO. • OLEAN, N. Y.

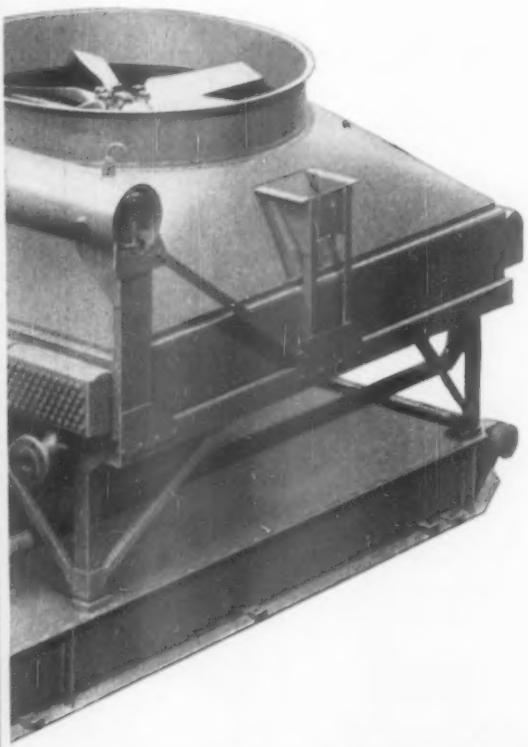
Offices in Principal Cities throughout the world



Clark Model HMAB-10, 550 bhp, skid-mounted, packaged compressor station.

CLARK "MIDGET ANGLE"

COMPRESSOR



CLARK

ONE OF THE DRESSER INDUSTRIES

COMPRESSORS

COMPRESSOR

HEAVIER IN ALL RESPECTS
Not just a re-rated HMA.

GREATER ENGINE DISPLACEMENT
8 ⅛" bore by 8 ⅞" stroke.

NEW, HEAVIER, UPPER AND LOWER CRANKCASES

NEW LINER, HEAD AND PISTON DESIGNS

NEW, HEAVIER CONNECTING RODS

NEW, HEAVIER CROSSHEAD AND CROSSHEAD PINS

NEW, FULLY INSULATED EXHAUST MANIFOLD
Saves 25% on engine cooling.

NEW, CHAIN-DRIVEN, ENGINE-MOUNTED WATER PUMP

NEW, EXTERNAL LUBE OIL PUMP

SAME, VIBRATION-FREE, BALANCED/OPPOSED DESIGN

RADIATOR

NEW, INDUCED, VERTICAL AIR FLOW
For improved cooling efficiency.

SUBSTANTIALLY GREATER COOLING CAPACITY

LOW, CLOSE-TO-SKID DESIGN
Eliminates vibration.

HYDRAULIC MOTOR, FAN DRIVE
Eliminates belts and counter shafts. Flywheel driven pump supplies fluid power.

STRAIGHT, FINNED TUBES
Removable header plugs permit visual inspection.

SIMPLE PIPING ARRANGEMENT
Easy access to scrubbers.

COOLING SURFACES SPREAD OUT
Permit closer approach to ambient temperature.

HIGHWAY WIDTH
Need not be removed from skid for shipping.

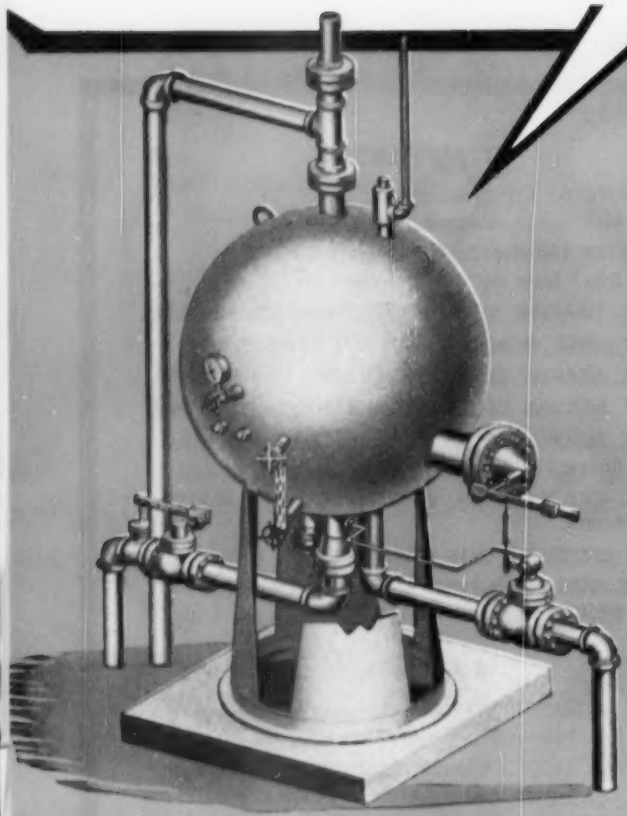
SKID

NEW, BOX TYPE CONSTRUCTION
Extra deep I-Beam and straight-through cross members highly resistant to bending and twisting.

SIMPLE TO INSTALL
Only two members to grout in.

HIGHWAY WIDTH
All piping confined to skid width.

Introducing The New BS&B Oil-Gas Spherical Separator



It's The Model "OGS" With *Exclusive* Internal Design!

BS&B's exclusive new Spherical Separator design takes full advantage of the spherical characteristics of the separator to provide maximum separation efficiency.

The inlet stream enters the top of the separator and passes through *three* separating stages as it flows downward through the vessel. Liquid is collected in the lower hemispherical head and is discharged by a liquid level controller through an outlet in the bottom of the vessel. Gas is also discharged out the bottom of the separator through a separate gas outlet pipe.

Type 30-26 (Low Pressure)

WP: 125 and 230 psi.
Shell Diameters: 40", 41", 46", 54".

Type 30-27 (Intermediate Pressure)

WP: 600 psi.
Shell Diameters: 24", 36", 42".

Type 30-28 (High Pressure)

WP: 1200 and 2000 psi.
Shell Diameters: 24", 36", 42".

FEATURES

1. **Simple Hookup**
   Connections to top inlet and bottom outlets are easily made from any direction.
2. **Liquid Slugs**
   Internal design diverts liquid slugs rapidly to the liquid section.
3. **High Capacity**
   The large ratio of liquid surface area to volume in the liquid section allows rapid release of solution gas from the oil.
4. **Controls**
   All controls and valves are BS&B.
5. **Small Space Requirement**
   Compact design is a distinct advantage of the Model "OGS" over other separators.
6. **Servicing**
   Convenient access openings are provided to simplify periodic cleaning and blow-down.

For Full Details on the BS&B Model "OGS" Spherical Separator, Contact Your BS&B Representative, or Write to . . .

BLACK, SIVALLS & BRYSON, INC.
Oil & Gas Equipment Division, Dept. 1-A11B
1708 West Main Street • Oklahoma City, Oklahoma

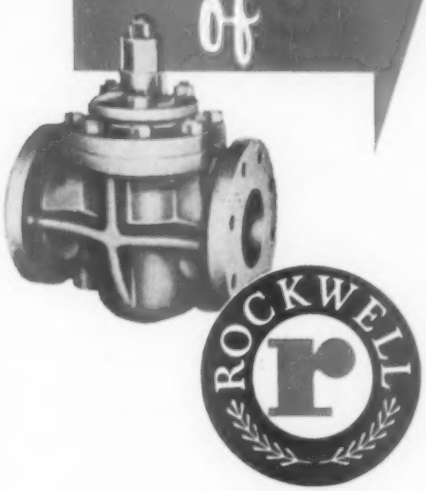
EFFICIENCY · OVER 60 YEARS · RELIABILITY
BS&B
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

A New and Finer Valve Service for Our Customers

MID-CONTINENT SUPPLY COMPANY

Now distributors of

ROCKWELL Nordstrom VALVES



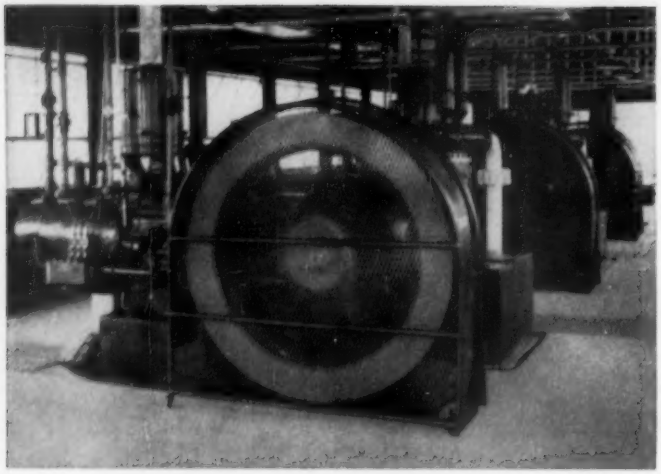
In keeping with its policy of offering the best oilfield service obtainable, Mid-Continent Supply Co. now offers a new and finer valve service to its customers. Famous Rockwell Manufacturing Company Nordstrom Valves, with their reputation for "eliminating valve problems before they begin," are now being distributed from Mid-Continent store and office points . . . throughout the oil country. Contact your nearest Mid-Continent store or office for complete information.

PESA

MID-CONTINENT Supply Company

MID-CONTINENT BLDG. • FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY



For PRODUCTION
as you want it

be sure of your **POWER** *with AJAX and GAS*

Secondary recovery puts a premium on power dependability. You *lose* when your pumps stop running—as every superintendent knows. AJAX Engines run in all weather, all the time, because *gas doesn't fail and the engines won't quit.* When you use AJAX, you use the finest gas engines ever built in our three-quarter-century of continuous manufacture. And you use *gas*—the lifeblood of your industry—which is sound, and it pays and pays! *Call your Supply Man.*

NO SERVICE INTERRUPTIONS

Summer's numberless thunderstorms, winter's gales and ice don't stop AJAX-and-gas! Production continues, savings roll in, your operating picture is stabilized.

NO BY-PASS WATER WASTE

The water you *By-pass* with constant speed prime movers (electric motors) costs the same money per barrel as the water you use!

Ajax Speed and Power FLEXIBILITY lets you control pressure and volume over a wide range. End money waste in costly *by-passed* water.

Builders of GAS AND

AJAX

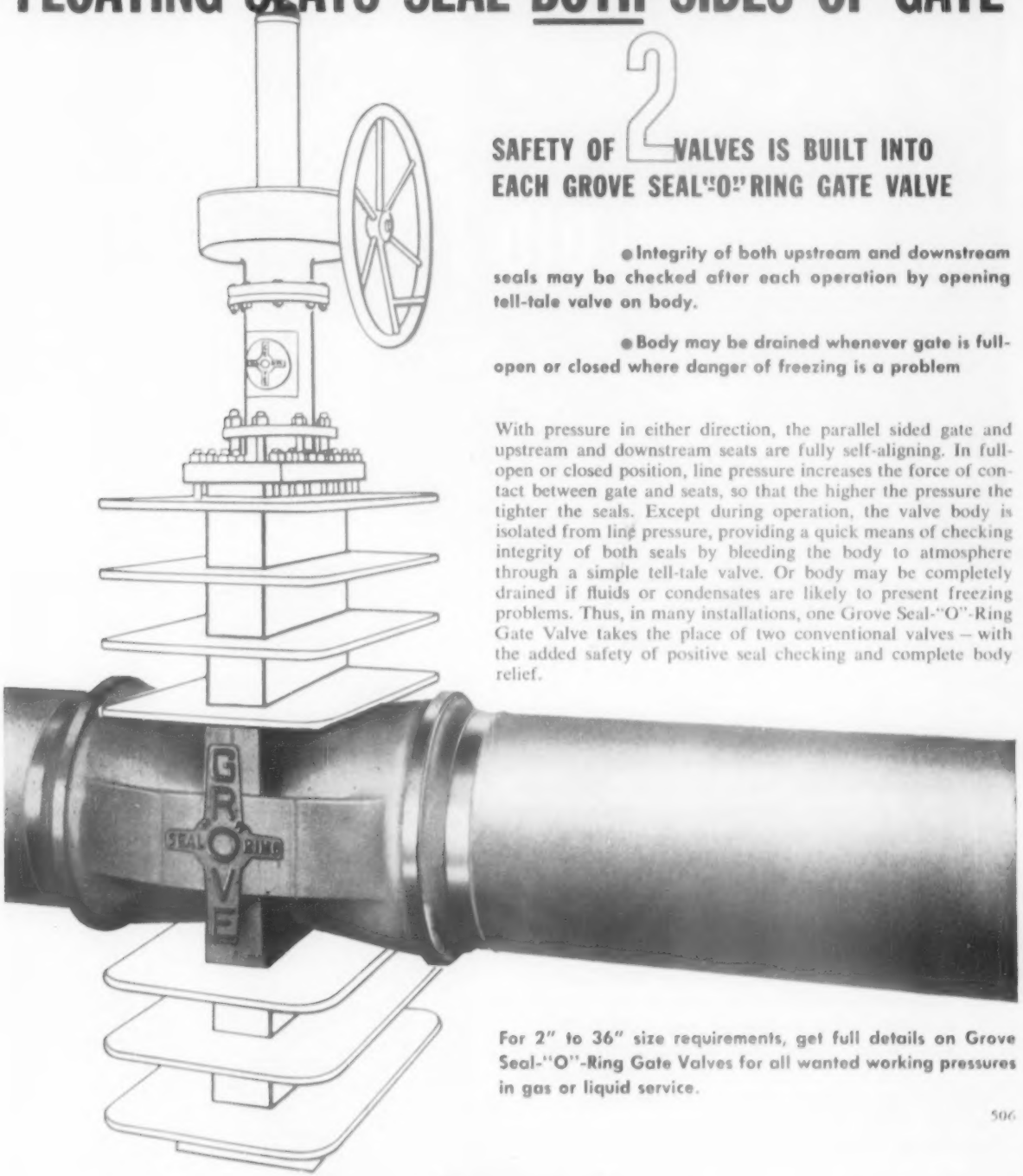
OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

AJAX IRON WORKS

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.; R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

FLOATING SEATS SEAL BOTH SIDES OF GATE



SAFETY OF 2 VALVES IS BUILT INTO EACH GROVE SEAL-"O"-RING GATE VALVE

- **Integrity of both upstream and downstream seals may be checked after each operation by opening tell-tale valve on body.**

- **Body may be drained whenever gate is full-open or closed where danger of freezing is a problem**

With pressure in either direction, the parallel sided gate and upstream and downstream seats are fully self-aligning. In full-open or closed position, line pressure increases the force of contact between gate and seats, so that the higher the pressure the tighter the seals. Except during operation, the valve body is isolated from line pressure, providing a quick means of checking integrity of both seals by bleeding the body to atmosphere through a simple tell-tale valve. Or body may be completely drained if fluids or condensates are likely to present freezing problems. Thus, in many installations, one Grove Seal-"O"-Ring Gate Valve takes the place of two conventional valves – with the added safety of positive seal checking and complete body relief.

For 2" to 36" size requirements, get full details on Grove Seal-"O"-Ring Gate Valves for all wanted working pressures in gas or liquid service.

506

GROVE SEAL-"O"-RING Gate Valves

GROVE VALVE and REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California
HOUSTON 4 — 1901 Calumet St. • • • • • • • • **LOS ANGELES 6** — 1930 W. Olympic Blvd.

ODESSA, TEX. • TULSA, OKLA. • LAFAYETTE, LA. • CHICAGO, ILL. • DENVER, COLO. • In Western Canada: GROVE VALVE LIMITED

GROVE SEAL O RING
GROVE SIMPLICITY ACCURACY SAFETY

new

a complete line of packaged FLUID AGITATORS!

Philadelphia Gear Works is proud to offer a new line of packaged fluid agitators . . . plus complete fluid agitation engineering service . . . plus field service —right in your plant—covering every phase of your particular fluid agitation applications. Our engineers are prepared to specify agitation to best meet your process requirements. As you know, Phillie Gear reducers for agitator drives have been meeting the most exacting standards of major processors for many years. We have the answers to your agitation problems. Let us assume the responsibility for every phase of your fluid agitator installations.

Complete production facilities assure prompt delivery . . . even with special agitator designs.

Phillie Gear manufactures every major component of the agitators, except motors and bearings.

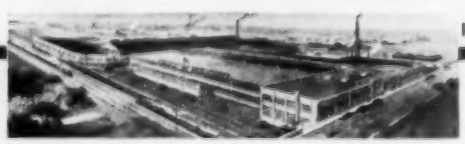
Quality control, from design to assembly, insures proper performance . . . long service life.

See our new agitator drive in action at the CHEM SHOW Dec. 5-9, Philadelphia Convention Hall, BOOTH 33.

SEND FOR ILLUSTRATED BULLETIN DESCRIBING NEW PACKAGED AGITATOR DRIVES.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. & G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND
Virginia Gear & Machine Corp. • Lynchburg, Va.



Industrial Gears & Speed Reducers

LimiTorque Valve Controls

Established 1892

With the Johnston-Sutliff Hydraulic Jar...

It's the HAND on the BRAKE that controls the JAR!

Completely controllable to give you the exact pressure you want, from a gentle, persuasive **tap** to an earth-shaking impact!

Changes to meet varying hole conditions, without coming out of the hole!

No torque needed!

Only two moving parts mean easy operation, plus dependable service anywhere, anytime!

Adaptable for use with the Johnston Formation Tester, famous the world over!

For fishing, or any other job where pipe or other equipment is stuck in the hole, no jar can match the results you can get with the Johnston-Sutliff Hydraulic Jar—and the experience of drillers everywhere proves it. Why not try it yourself?

FOR COMPLETE INFORMATION WRITE, WIRE OR PHONE

JOHNSTON TESTERS

first in drill stem testing

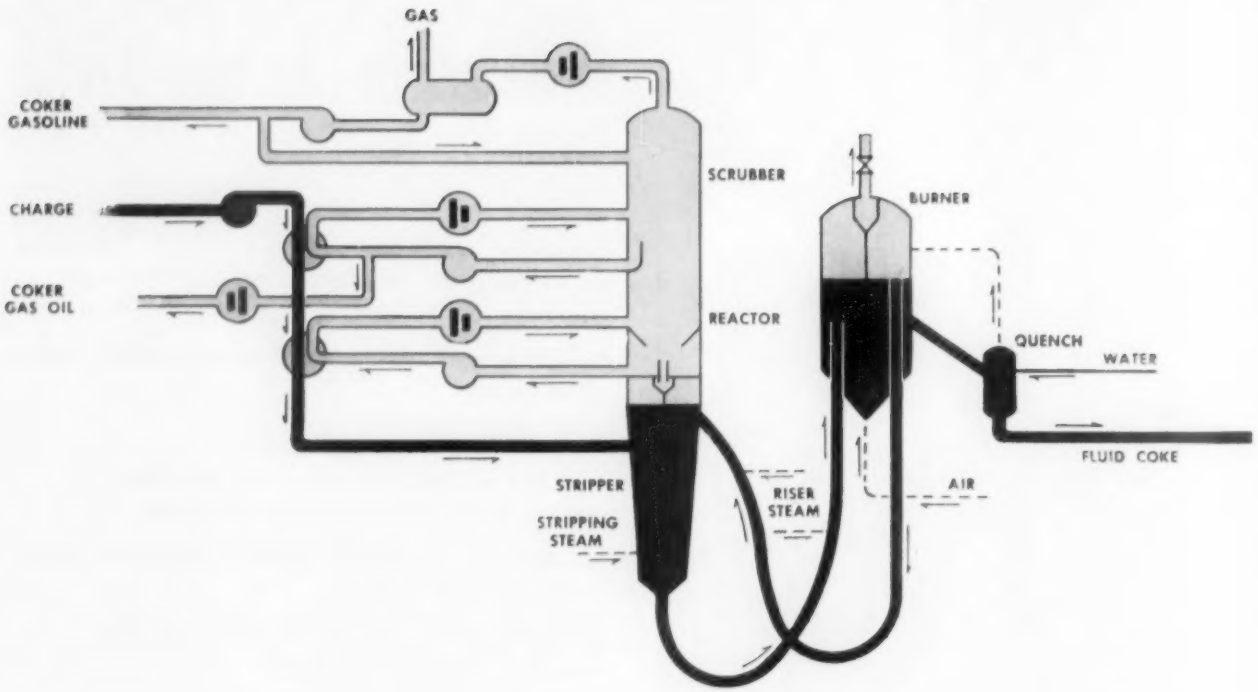
FORMATION AND CASING TESTING — JOHNSTON

J552

P. O. Box 98,
HOUSTON, TEXAS
LOS ANGELES, CALIF. • CALGARY, CAN.

fluid

its production...



IN THIS latest application of the fluidized-solids technique, developed by Esso Research and Engineering, heavy residua and asphalts can be converted to gas, oil and coke.

As shown in the flow diagram above, finely divided coke particles flow between two vessels—a burner and a reactor. In the burner, part of the coke stream is burned to supply the heats for vaporization, cracking and losses. When this hot coke meets the feed in the reactor, coking results and the liquid products are flashed off.

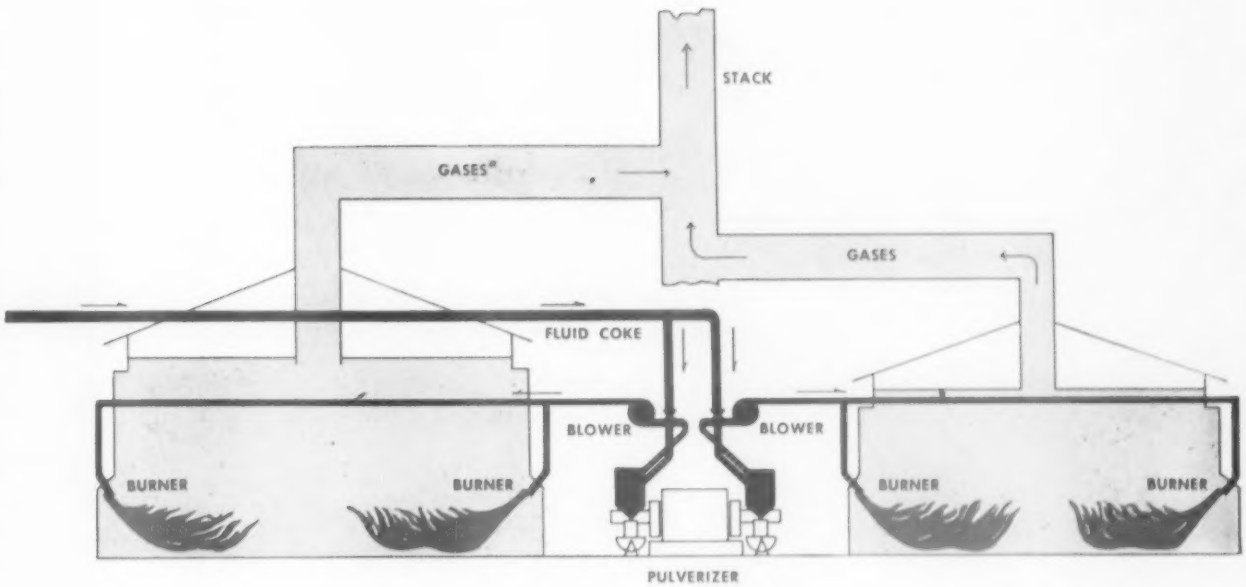
Coke particle size ranges between 75 and 150 microns and the coke itself is a clean, dustless solid. The feed is preheated through two fractionator (scrubber) pump-around systems. In the reactor it contacts the hot coke flowing from the burner. Coke is formed as the fluidized bed moves down into the stripper section where steam removes any remaining volatiles. The stripped coke then flows into the burner where, in contact with air, approximately 5 per cent by weight of the charge is burned. The coke inventory in the unit is fixed and the excess is removed as product coke which is cooled by water spray before flowing to storage.

The vapors from the reactor pass into the scrubber-fractionator section where they are separated into gas, gasoline and gas oil.

FOSTER

coke

...and utilization



THE USE of fluid coke as a fuel is illustrated in the above simplified diagram of two heaters designed by Foster Wheeler for a large oil company. They will supply the heat requirements for the atmospheric and vacuum sections of the highest capacity crude distillation unit in the world, having a combined heat absorption capacity of 336,400,000 btu per hour.

The pulverizers which reduce the particle size of the fluid coke before it is burned in the furnaces, as well as the pulverized coke burners, are also of Foster Wheeler design.

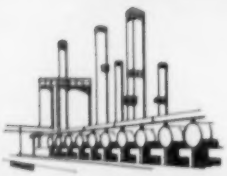
Designs are also available for the burning of fluid coke in steam generators.

Foster Wheeler's experience in the design of equipment for both the *production* and *utilization* of fluid coke will be of value to any process plant interested in converting heavy residua into cracking stock and making effective use of the resulting solid fuel. For further details on this process, or for proposals to meet your specific requirements, write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

WHEELER

LONDON
NEW YORK
PARIS
ST. CATHARINES, ONT.

here a leak is annoying



here a leak is expensive

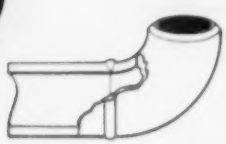
here's how B&W SEAMLESS ALLOY WELDING FITTINGS KEEP PIPELINES PERMANENTLY LEAKPROOF AND MAINTENANCE-FREE!

In welded construction, using welding fittings, the strength of the weld approaches that of the pipe itself, making such piping safe and dependable.

Maintenance problems of a flanged assembly, such as caulking, gasket replacement, bolt tightening, etc. are non-existent. Thousands of dollars can be saved on maintenance alone during the normal service life of a welded piping layout.

DESIGN FOR PERMANENCE WITH B&W SEAMLESS WELDING FITTINGS

Comparison proves the practicality of using B&W Seamless Welding Fittings in a piping system.



Uniformly machined bevel ends, and true dimensional accuracy of B&W Welding Fittings assure quick and positive fit-up to pipe. Note the smooth unbroken inner wall of the welded joint. There are no pockets or crevices to intercept smooth flow and cause an eventual failure. Combined with the strength of a sound weld, this permits a piping system to be permanently leakproof and maintenance free.

B&W SEAMLESS WELDING FITTINGS

GRADES:
Carbon, Alloy and Stainless Steels.

TYPES:
Elbows, Tees, Caps, Saddles, Laterals, Nipples, Returns, Flanges, Stub Ends, Reducers, Crosses, Bull Plugs.

SIZES:
Complete range of sizes and schedules.

IT PAYS TO LOOK AT THE ADVANTAGES OF USING B&W SEAMLESS WELDING FITTINGS

Welded Construction Assures Minimum Pressure Loss — True circularity and radii, and smooth inner walls reduce friction and turbulence.

Whole Sections Can Be Shop-Fabricated — Ease of fabrication permits entire sections to be shop-fabricated and installed in a few minutes.

Welded Construction is Permanent — Maintenance costs are kept at a minimum because piping is permanently leakproof.

Welded Construction Takes Less Space — Piping can be nested in corners, or fitted against ceilings, walls or equipment.

Welded Construction is Simple to Install — Dimensional accuracy of angles, radii, and bevels, assures quick and easy joining.

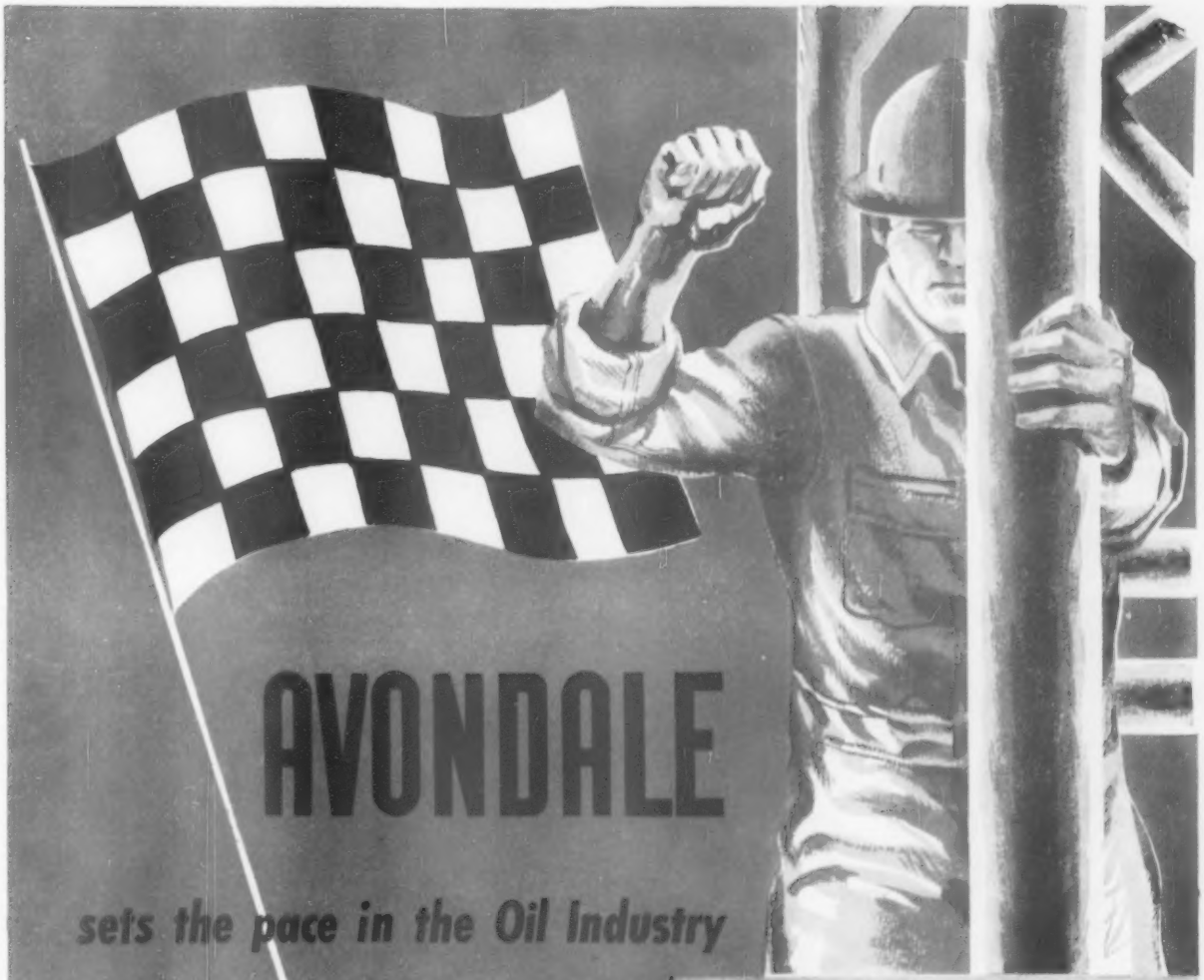
Welded Construction is Lightweight — Strength combined with lightness in weight permits easy handling.

THE *NATURAL* SOURCE FOR ALLOY FITTINGS

THE BABCOCK & WILCOX COMPANY
Tubular Products Division • Fittings Department
3839 W. BURNHAM ST. • MILWAUKEE 46, WIS.

FA-5912

District Sales Offices: BEAVER FALLS, PA. • BOSTON 16, MASS. • CHICAGO 3, ILL. • CINCINNATI 6, OHIO • CLEVELAND 14, OHIO • DETROIT 26, MICH. • HOUSTON 19, TEX. LOS ANGELES 17, CAL. • MILWAUKEE 46, WIS. • NEW YORK 16, N. Y. • PHILADELPHIA 2, PA. • ST. LOUIS 8, MO. • SAN FRANCISCO 3, CAL. • SYRACUSE 2, N. Y. • TULSA 3, OKLA.



AVONDALE

sets the pace in the Oil Industry

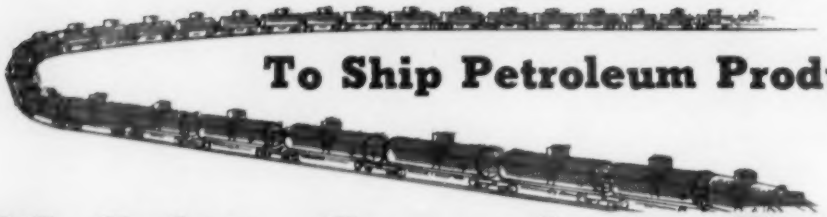
Everywhere you go in the oil country, you'll find "Pace-Setters" built by Avondale—pipe jackets, vessels and barges of all kinds, offshore drilling rigs and platform structures. You'll find successful conversions, too—LSTs and other craft . . . and many, many examples of Avondale's skilled repair jobs. On land, you'll see pace-setting service stations built of Avoncraft porcelain enamel—still another example of Avondale's versatile and complete service to the Oil Industry. For your next construction, repair, or fabrication job, large or small . . . call Avondale.

SERVICE • INTEGRITY • EFFICIENCY

SHIP BUILDING • SHIP REPAIRING • FOUNDERS • PROPELLERS • STRUCTURAL STEEL

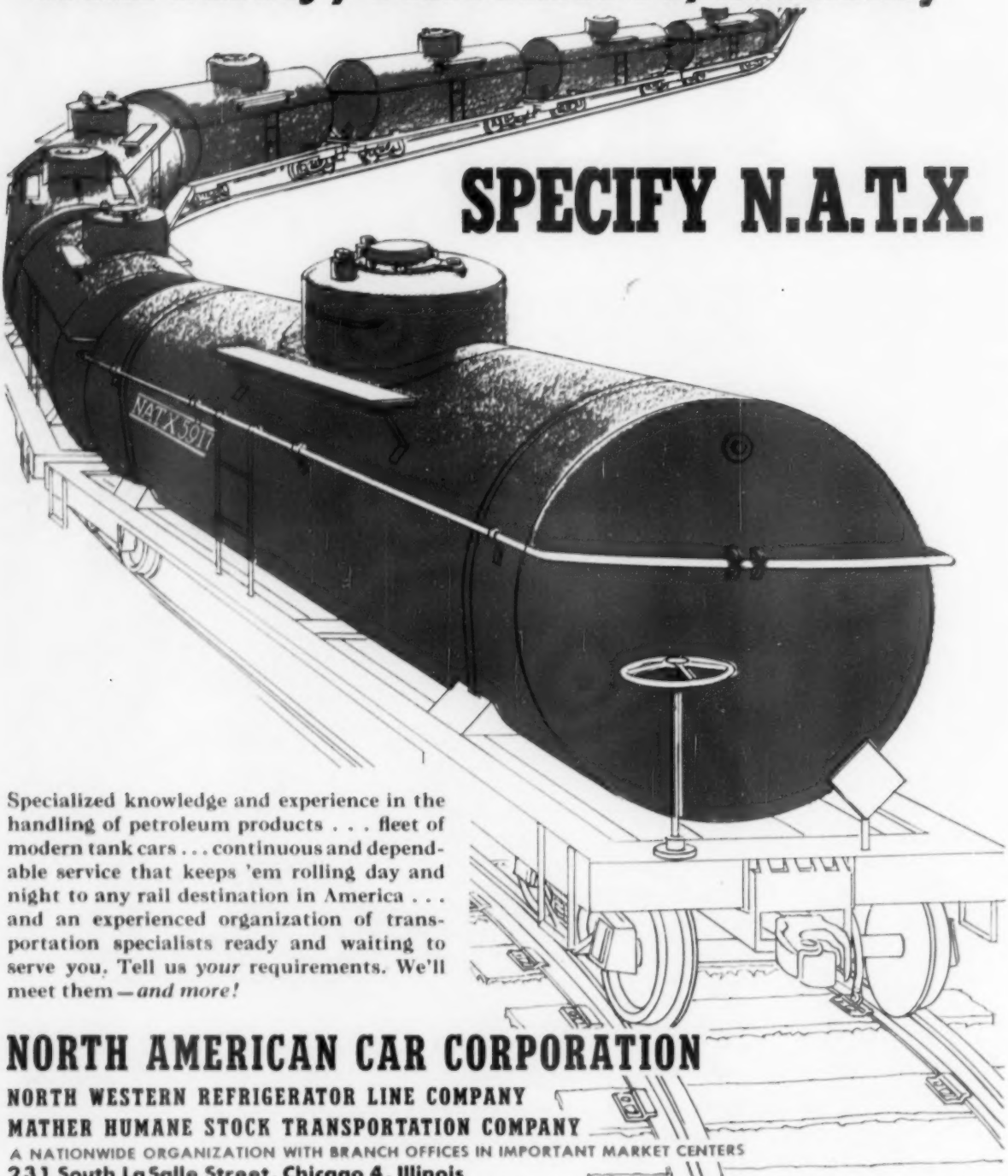
AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P.O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U.S.A.



To Ship Petroleum Products

With Safety, Convenience, Economy



SPECIFY N.A.T.X.

Specialized knowledge and experience in the handling of petroleum products . . . fleet of modern tank cars . . . continuous and dependable service that keeps 'em rolling day and night to any rail destination in America . . . and an experienced organization of transportation specialists ready and waiting to serve you. Tell us *your* requirements. We'll meet them—*and more!*

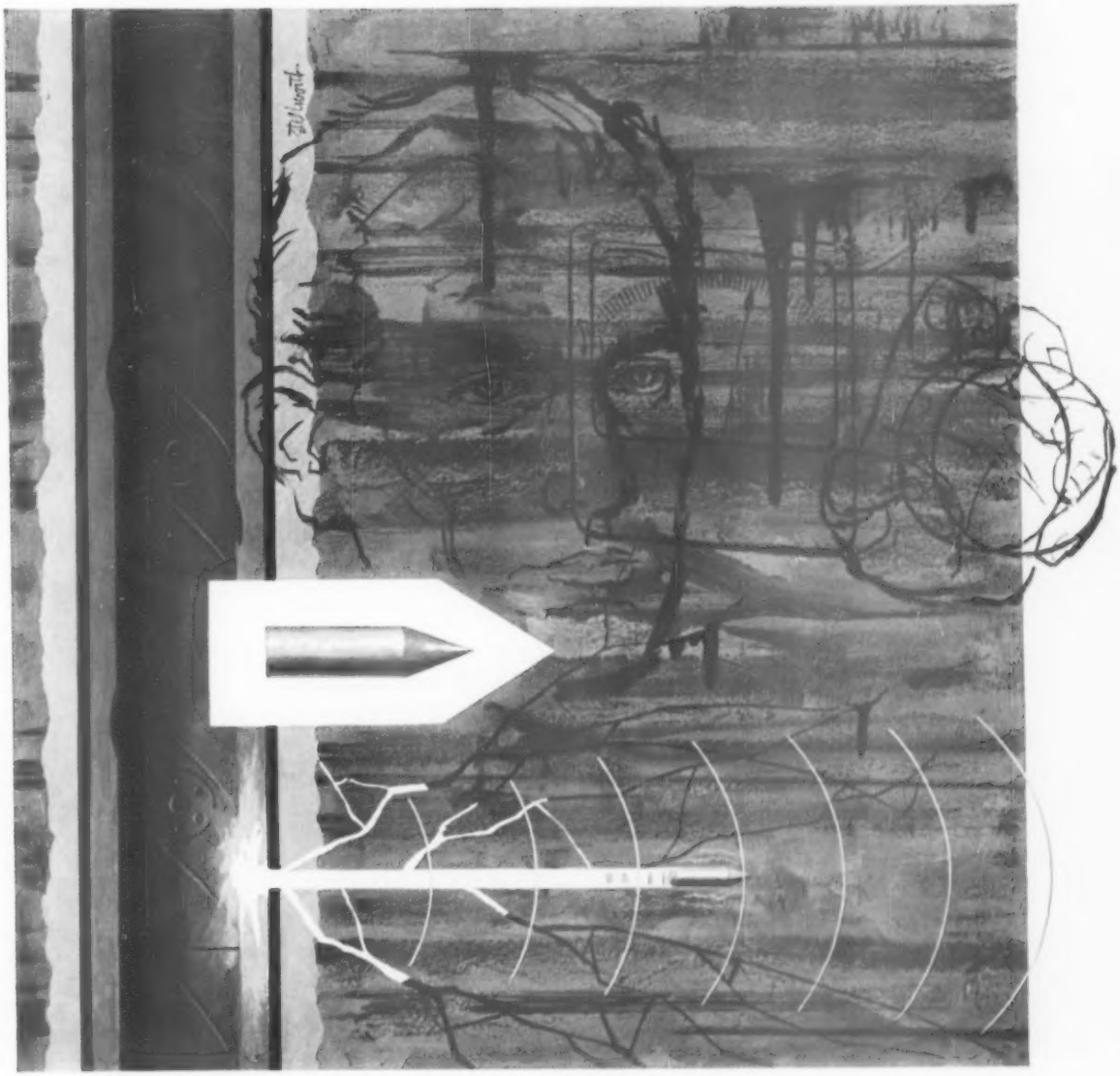
NORTH AMERICAN CAR CORPORATION

NORTH WESTERN REFRIGERATOR LINE COMPANY
MATHER HUMANE STOCK TRANSPORTATION COMPANY

A NATIONWIDE ORGANIZATION WITH BRANCH OFFICES IN IMPORTANT MARKET CENTERS

231 South LaSalle Street, Chicago 4, Illinois

Dallas • Fond du Lac • St. Paul • St. Louis • Tulsa • San Francisco • New York



The Schlumberger SUPER GUN

The Bullet Gun that set the standard for the Perforating Industry

IT'S AVAILABLE: Now every Schlumberger perforating location can serve your needs.
IT'S ECONOMICAL: You get premium perforating at standard prices.
IT'S POWERFUL: Engineered to give a maximum and uniform penetration.
IT'S RAPID: Up to 96 shots can be run on one trip in the hole.
IT'S FLEXIBLE: Choice of 2 guns and 4 bullet sizes with selective firing.

THE EYES OF THE OIL INDUSTRY

SCHLUMBERGER
Well Surveying Corporation

THE STRONGEST WIRE
MAKES THE STRONGEST ROPE...
THAT'S WHY ONLY 1105 IS USED IN

ROEBLING

Royal Blue

WIRE 1105 ROPE

1105 WIRE is the strongest and toughest rope wire that has ever been developed.

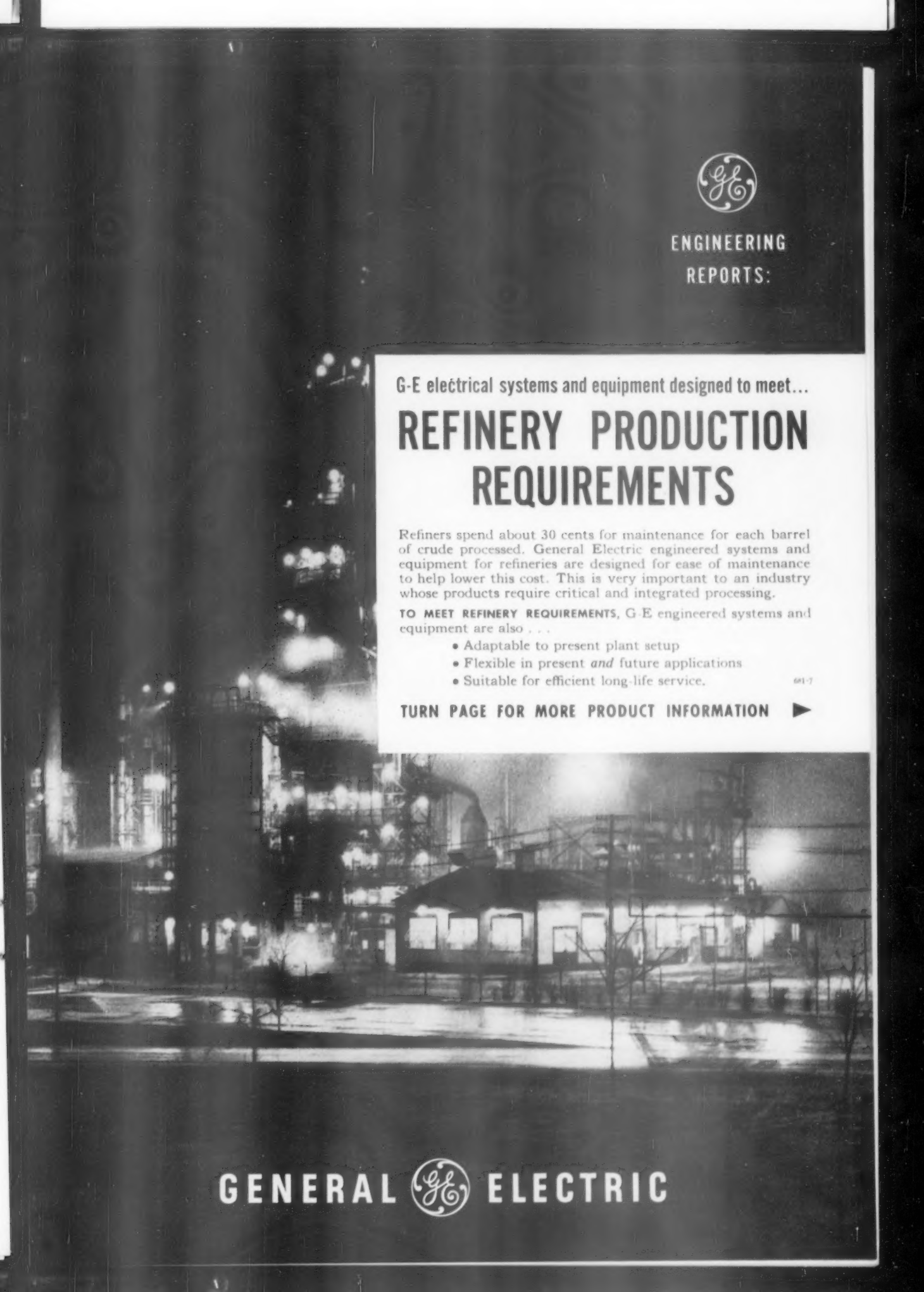
Royal Blue is a new all-steel wire rope. It's made of 1105 wire—stands up in service—gives you more for your money because it has more to give.

Ask us for the full facts about Royal Blue Wire Rope, or contact your Roebling distributor.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 815 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST. AVE. S. • TULSA, 321 N. CHEYENNE ST.
EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.



ENGINEERING
REPORTS:

G-E electrical systems and equipment designed to meet...

REFINERY PRODUCTION REQUIREMENTS

Refiners spend about 30 cents for maintenance for each barrel of crude processed. General Electric engineered systems and equipment for refineries are designed for ease of maintenance to help lower this cost. This is very important to an industry whose products require critical and integrated processing.

TO MEET REFINERY REQUIREMENTS, G-E engineered systems and equipment are also . . .

- Adaptable to present plant setup
- Flexible in present *and* future applications
- Suitable for efficient long-life service.

691-7

TURN PAGE FOR MORE PRODUCT INFORMATION ►

GENERAL ELECTRIC

SEVERAL AVAILABLE TYPES of protective enclosures make G-E motors ideal for all indoor or outdoor uses. New Polyex insulation

G-E ENGINEERED DRIVES AND POWER SYSTEMS MEAN . . .

Modern, more flexible processing lines

IN THE NEXT TEN YEARS, production must increase an estimated 50% to meet greater consumer needs. Available manpower will increase only an estimated 14% during the same period.

INCREASED OUTPUT AND EFFICIENCY must close the production gap between available manpower and estimated demand. General Electric electrical systems are designed and installed for efficient, flexible, easily expanded production.

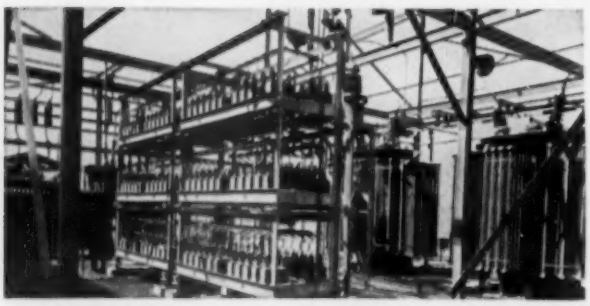
G-E ENGINEERING SERVICES (see back page) can help you meet production requirements to bring your electrical system up to date. The result is a modern system integrated into your present plant setup.

FOR ADDITIONAL INFORMATION on how G-E engineered systems and engineering services can help you, contact your G-E Apparatus Sales Representative during your early planning at the nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

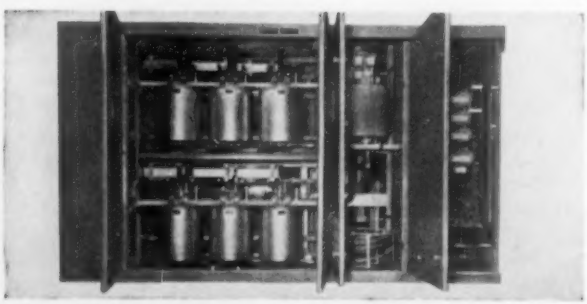
681-5

Engineered Electrical Systems for Process Industries

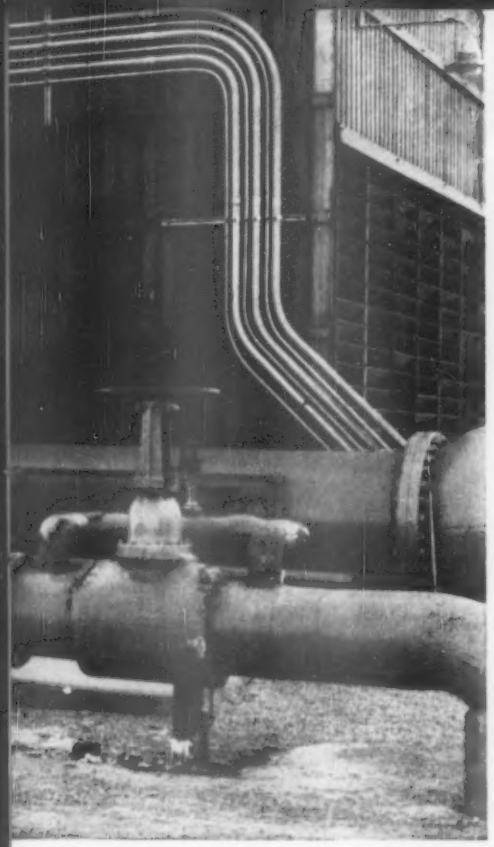
GENERAL ELECTRIC



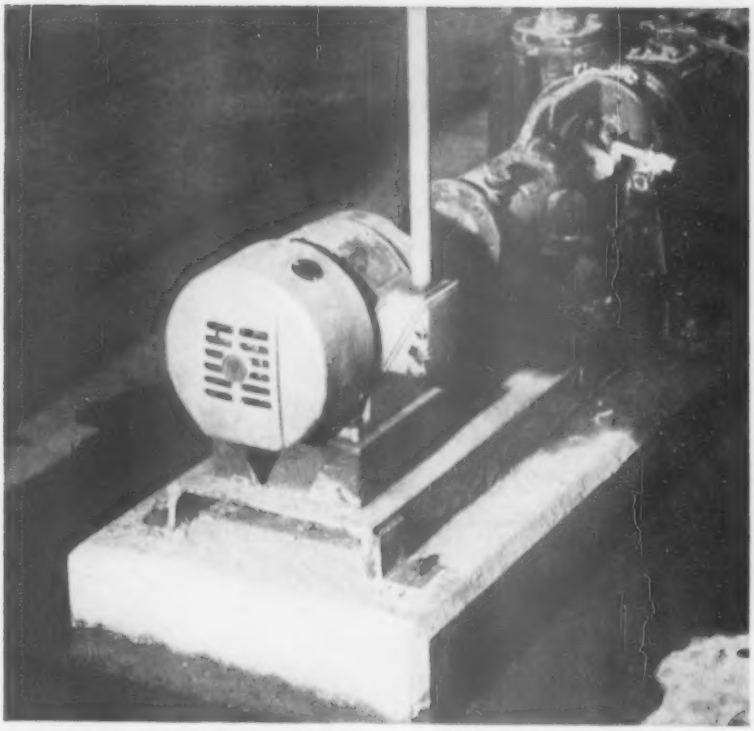
"BUILDING-BLOCK" design of this stack-rack capacitor block reduces installation costs. This design means equipment may easily be expanded or moved to meet plant requirements.



HIGH EFFICIENCY and low installation cost of this pumpless rectifier provide more reliable and economical d-c power. Factory wired, the unit is ready when it arrives to connect and operate.



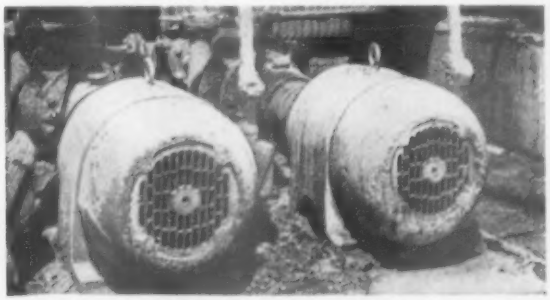
gives up to 50% longer motor life.



NEW G-E TRI-CLAD® '55' MOTORS, totally enclosed, are suitable for damp areas, even where hosing is necessary. New cooling system cleans while it cools motor.

for your plant

G-E MAGNETIC STARTERS and safety switches are compact, for maximum space savings. Short-circuit protection is provided by circuit breaker or fusible disconnect switch.



CORROSIVE ATMOSPHERE effects are greatly minimized in these G-E Tri-Clad induction motors. Rugged cast-iron construction makes them excellent for process application.

SHORT CIRCUIT PROTECTION up to 60,000 amps, plus 50% greater space savings are provided by all-new G-E Limitamp®.

*Reg. Trademark of General Electric Company

SIX G-E ENGINEERING SERVICES . . .

HELP YOU PROTECT YOUR EQUIPMENT INVESTMENT

1 **G-E APPLICATION ENGINEERING** helps you and your consultants design the right electric system for your plant.

2 **G-E ANALYTICAL ENGINEERING** helps attain the optimum electrical system for your application. Engineering experience backed up by electronic system analyzers save valuable design time.

3 **G-E PRODUCT DEVELOPMENT** laboratories design and test new equipment under tomorrow's conditions to meet your future demands.

4 **G-E FIELD-SERVICE ENGINEERING** helps you supervise installation, expedite start-up of your major electric equipment.

5 **G-E MAINTENANCE SERVICE** from 36 G-E Service Shops will repair and uprate your old equipment, help establish productive maintenance of your equipment, furnish emergency service.

6 **G-E PROJECT CO-ORDINATION** means on-time engineering, shipment, installation of your electric equipment from preliminary diagrams through start-up.

These valuable services are available to you with General Electric equipment. Contact any General Electric Apparatus Sales Office. Meanwhile, for the full story of G-E engineering services, write for brochure GED-2244, General Electric Co., Section 681-5, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

They Say—

Tidelands Title Undecided

"Louisiana is credited with a victory in the famous tidelands litigation. The U. S. Supreme Court denied a motion of the Government for setting a 3-mile oil drilling limit. It is evident that the case will go on.

"This is a multibillion-dollar case. The yield of oil in the regions close to shore has already become great. There are further billions of dollars involved in the tidelands between the 3-mile limit and the Spanish grant limit . . . We can hardly expect so momentous a contest to be settled in a hurry. The Supreme Court has not yet decided the case in detail. Probably a series of new suits and several rounds of big-time and states-rights arguments are to come."

Editorial, Tulsa World.

Editorial Finds Favor

Dear Sir:

"We would like your permission to reprint the editorial appearing on page 119 of your September 26, 1955 issue ("Are Drilling Contractors Being Penalized for Progress?"). We think it is one of the finest things yet written about the problem and would like to send copies out to both producing companies and drilling contractors in this area . . ."

Richard Fenton
Executive Vice President
California Drilling
Contractors Assn.

A Matter of Time

Dear Sir:

"We notice, in reading the article on foreign drilling in the September 26 issue (page 122), that you show the date of Delta's original entry into foreign operations as 1942.

"Actually, Delta did not enter the foreign field until some time in 1944."

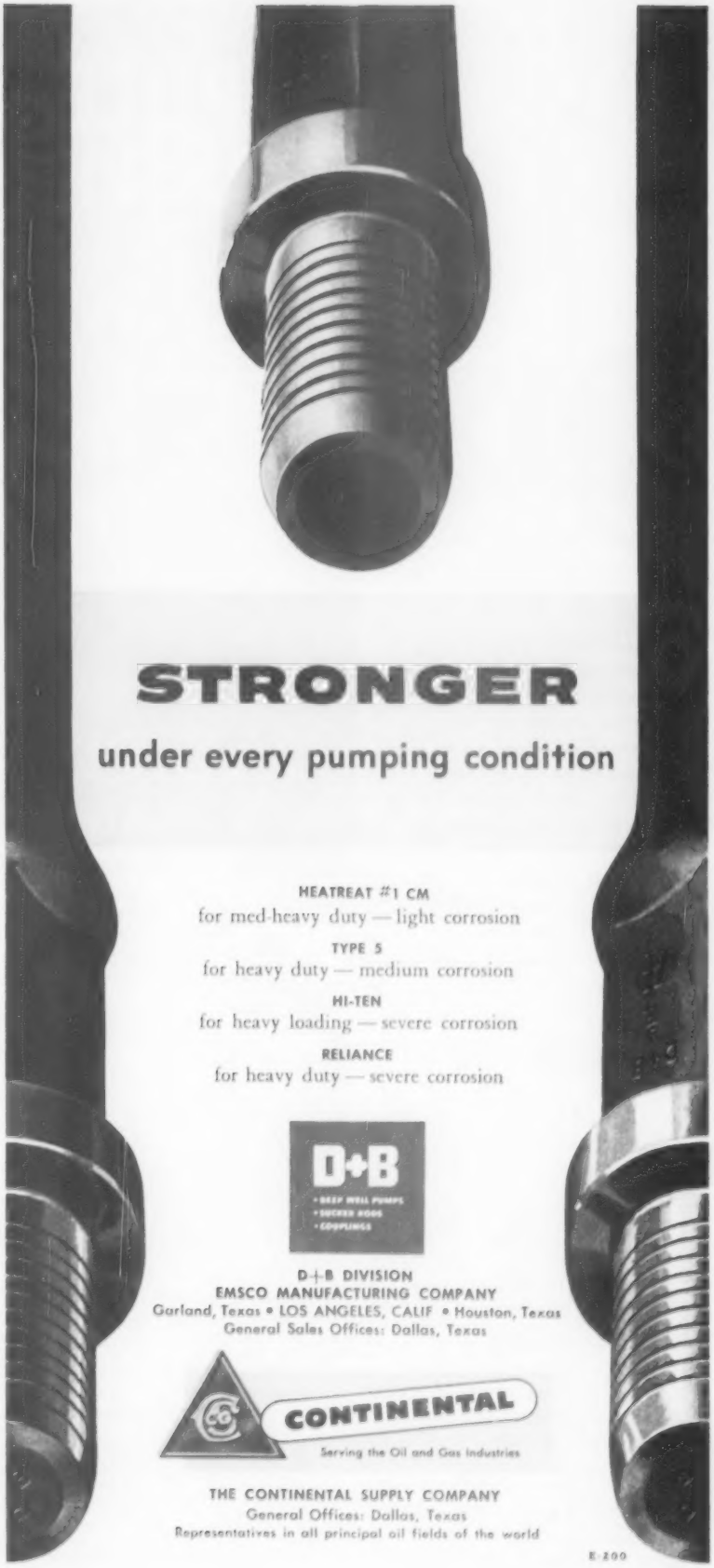
M. A. Marshall
Delta Drilling Co.
Tyler, Tex.

Dispute Over Pumping

Dear Sir:

In your September 26, 1955, issue in the article entitled 'Job Improvement for Process Foremen—23,' page 261, I was most astonished to read the following inaccurate statement:

"A liquid can neither be 'pulled' or 'sucked' by a centrifugal pump, but must be forced by pressure into the



HIGHER HEAT OUTPUT!

drayer-hanson CAL-FIN tank heaters

"HORIZONTALS" are best for even heat distribution. Finned construction takes eight times less tubing than pipe coils and . . . Drayer-Hanson's horizontal Cal-Fin Tank Heaters feature a new, exclusive finning equipment capable of helically winding and welding serrated stainless or carbon steel fins to stainless or carbon steel tubes. These serrated fins set up eddy currents which give higher heat transfer coefficients, combat laminar flow.

20 STANDARD SIZES:
up to 1,325 sq. ft.

SPECIAL SIZES:
up to 6,000 sq. ft.

Our Exclusive Finning Process Does it!

d-h SINCE 1910

drayer-hanson INCORPORATED

3301 MEDFORD STREET, LOS ANGELES 63, CALIFORNIA

SUBSIDIARY OF NATIONAL-U.S. RADIATOR CORPORATION

TO: DRAYER-HANSON, INC., 3301 Medford St., Los Angeles 63, Calif.
Please send Bulletin 3005 on Cal-Fin Tank Heaters

NAME:_____ TITLE:_____

COMPANY:_____

STREET:_____ CITY:_____ STATE:_____

impeller of the pump. A positive liquid head must be maintained on the suction at all times to actually force the liquid being pumped into the impeller."

If this is true of liquids such as light hydrocarbons the absolute vapor pressure of which is higher than the absolute pressure at the impeller eye, it is absolutely untrue for liquids having the lower vapor pressure which most certainly may be 'pulled' or 'sucked' provided the pump has been adequately primed.

As a matter of fact, to my knowledge, American pump manufacturers' catalogs usually figure pump head capacity curves showing the characteristics for pumps handling cold water with 15 ft. of suction lift. If that is not 'pulling' or 'sucking' what is it?

N. Mestchersky, Engineer
Maintenance and
Engineering Dept.
Caltex, S.A.F., Ambes, France

Editor's Note: It is believed that the situation raised by Reader Mestchersky is entirely one of definitions. All three of the fluid flow definitions "pulling," "sucked," and "forced" are actions which result from a condition where a pressure drop exists; or, to turn this around, where a condition of pressure drop exists, the liquid is pulled or sucked or forced into the impeller of the pump.

Lubrication a Bargain

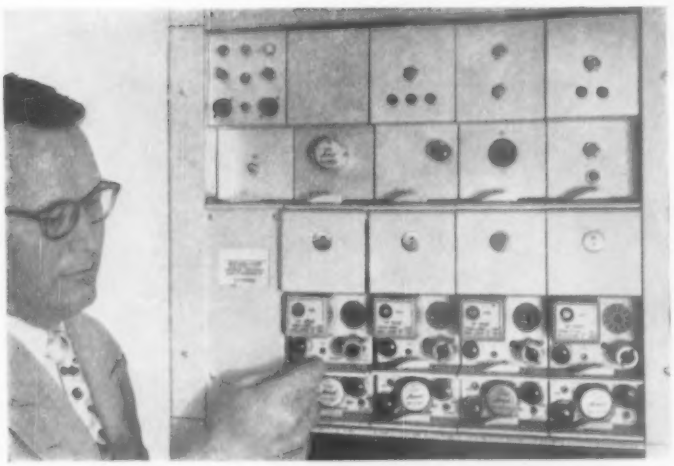
"Once in a while one of my friends complains of the high cost of lubrication. Actually, though, by comparison, lubrication is a real bargain. For example, I recall that in 1939 I took delivery on a new Oldsmobile for $915, including heater . . . The full delivered price of the cheapest 1956 model of the same make, including heater and Hydra-Matic would be close to $2,800.

"To lubricate the 1939 car using the most expensive oil then available, with twice yearly seasonal changes of gear lubricant, and chassis lubrication plus oil changes about every 1,000 miles for the national average mileage cost about $28 per year or about 3 per cent of the purchase price.

"To lubricate the 1956 equivalent, using a 60 cent quart multi-grade oil, and . . . changing the automatic transmission fluid once a year, and forcing lubricant into the rear axle once a year, plus oil changes and chassis lubrication about every 1,000 miles, the cost today is approximately $54 or a little less than 2 per cent of the purchase price.

. . . Lubrication of the car is a bigger bargain than the car itself. If the cost of lubrication had advanced as rapidly as the cost of the car, the best oil should sell for about $1.10 per quart, a pound of gear oil for 90 cents, and

First Carrier System Using Transistors!



. . . **LENKURT'S** *new type 45CB*
4 channels — only 15½ inches high!

Here's a completely new open-wire carrier system which: (1) provides an *inexpensive* way to expand your circuit groups beyond the capacity of low-frequency carrier, (2) requires only *minimum space*.

All the advantages of Type 45 miniaturized carrier—formerly available only for large circuit groups—are now offered in groups of only four channels, or even less.

Type 45CB gives you the kind of performance you have come to expect of Lenkurt carrier. Each channel has its own separate Compandor, its own built-in signal channel, and its own channel regulator. This system provides toll-quality transmission for short- and medium-haul applications—even when line conditions are less than ideal. Consider, also, these additional features:

- **Compact equipment arrangements**—The four-channel assembly occupies only 15½ inches of vertical space on a 19-inch rack.
- **Plug-in construction** facilitates installation, line-up and maintenance.
- **Constant receiving level,** through combined action of system regulator and individual channel regulators.
- **Minimized line-treatment problems** at repeater points, because of "frequency-frogging" carrier repeaters.
- **Low power consumption**—Transistorized common-equipment units require little power, and reduce problems of heat dissipation.
- **Flexibility of interconnection**—Type 45CB systems can be interconnected at carrier frequencies with other 45-class systems. The frequency allocation is between 40 and 76 kc, which permits operation on lines already equipped with 33A or other low-frequency carrier systems.

If you need more circuits, you'll certainly want to consider Type 45CB Carrier. Write today for complete information. *Address* Automatic Electric Sales Corporation, 1033 West Van Buren Street (HAymarket 1-4300), Chicago 7, Illinois. *In Canada:* Automatic Electric Sales (Canada) Ltd., Toronto. *Offices in principal cities.*

Manufactured for

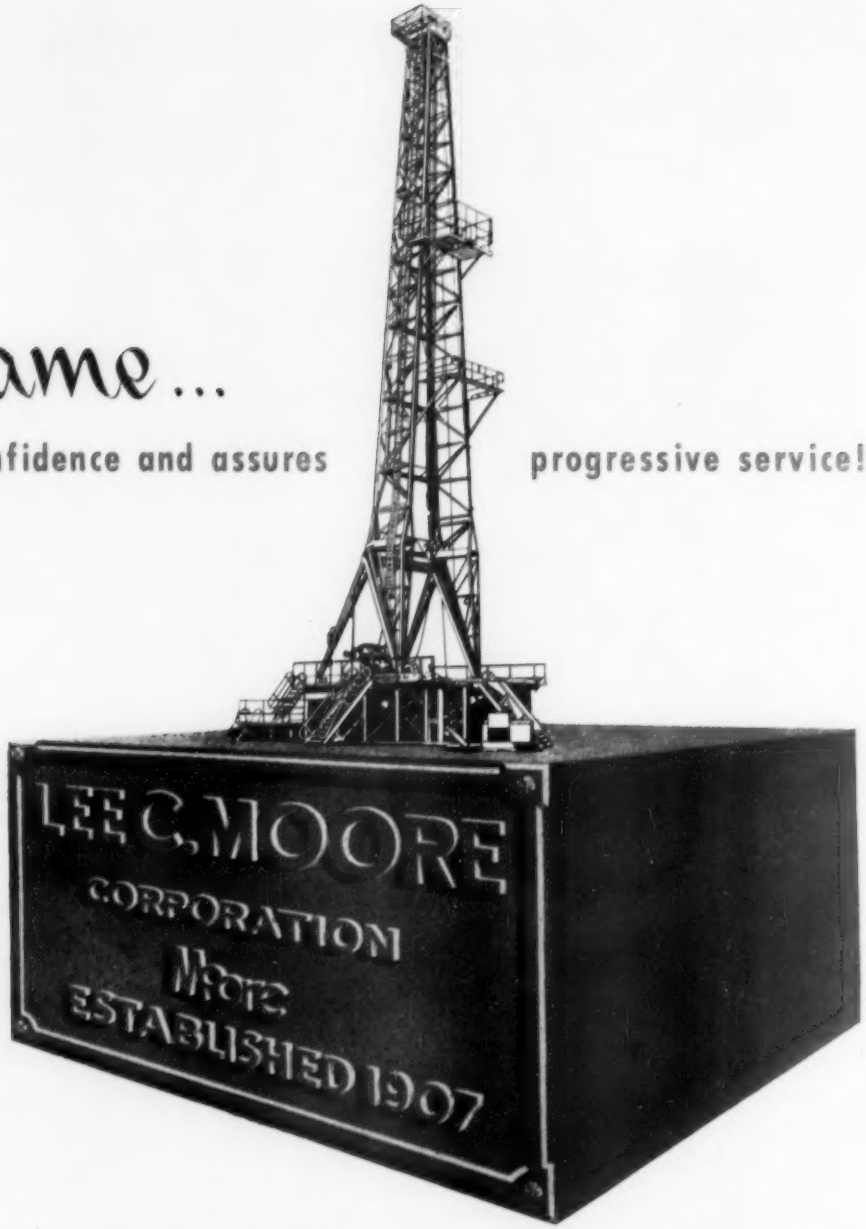
AUTOMATIC ELECTRIC

ORIGINATORS OF THE AUTOMATIC DIAL TELEPHONE

AUTOMATIC ELECTRIC • LEADERS IN CARRIER COMMUNICATIONS • **LENKURT**

a name...

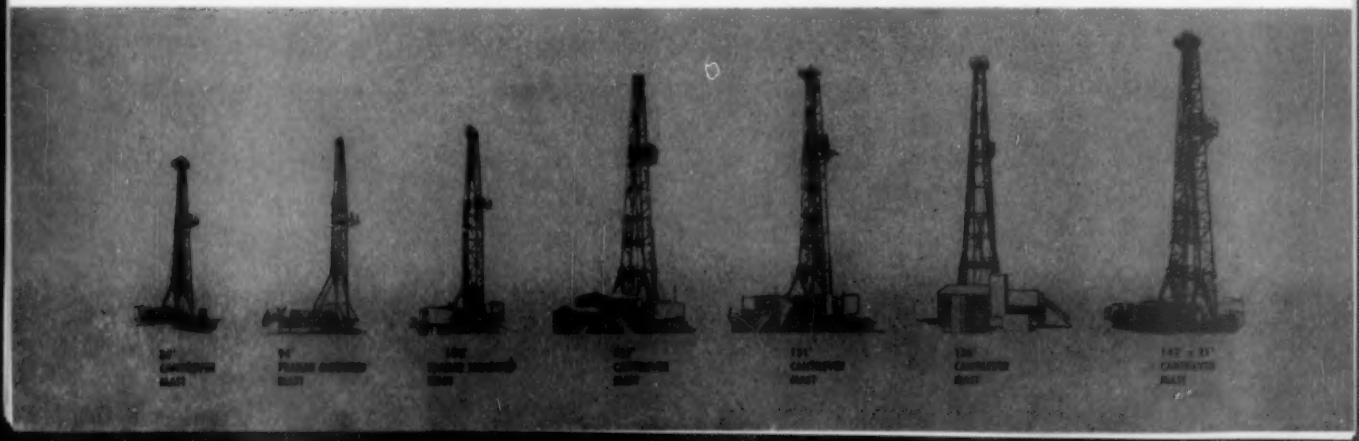
that justifies confidence and assures progressive service!



LEE C. Moore CORPORATION

TULSA • SHREVEPORT • GREAT BEND • CASPER • NEW ORLEANS • CENTRALIA • DALLAS • HOUSTON • MIDLAND • PITTSBURGH

EXPORT OFFICE: ROOM 624 INTERNATIONAL BLDG., 630 5TH AVENUE, NEW YORK 20, NEW YORK
FOREIGN LICENSED MANUFACTURER • OIL WELL ENGINEERING CO., LTD. • CHEADLE HEATH, STOCKPORT ENGLAND



a chassis lube job should run from $2.30 to $3."

G. A. Olsen in president's address to National Lubricating Grease Institute, Chicago.

Geologist Agrees

Dear Sir:

Your editorial concerning geological conventions in a recent issue of The Oil and Gas Journal (October 17, page 79) presented a very justifiable criticism of geologists in a humorous and nonantagonistic way. I have shared your feeling many times at conventions or while trying to read geological articles.

A.A.P.G. Member (name withheld).

Public Relations Idea

Dear Sir:

I thought your editorial of October 17 a very intelligent observation about where the real responsibility for good public relations rests. It expresses an idea that I have been laboring to these many years to impress upon our people.

Conger Reynolds
Public Relations Director
Standard Oil Co. (Ind.).

St. Louis and Oil

"The oil industry owes a very substantial debt to St. Louis . . . for unparalleled services rendered in creating and stimulating the great market for oil products that exists today . . . No other single city has made greater contributions to petroleum's progress.

". . . The St. Louis World's Fair of 1904 for all practical purposes gave the automobile popular acceptance as a means of mass transportation. The gasoline buggy had been in existence for some time before 1904 but it had been looked at pretty skeptically by most people.

"The great St. Louis Fair changed all that. A highlight of the fair was a grand tour of 70 automobiles cross country from the Atlantic Coast to the fairgrounds . . . In the end 58 completed the trip after 16 days on the rugged roads of that period. Such a gasoline-fired expedition was an eye-opener to the hundreds of thousands who actually saw the cars go by and to the millions who read of it. On automobile day at the fair, more than 300 cars participated in a parade that wound through the city and into the grounds, providing what one observer described as the greatest demonstration of horseless vehicles ever witnessed.

"Even more closely and importantly allied with St. Louis is the diesel engine. Dr. Rudolph Diesel in Germany first patented his idea for a new type

"Some of those Jet Bits were made in an old Aircraft Plant."

The free world is using more oil than ever before. To keep pace, oil wells are being drilled nearly ten times faster than they were 30 years ago. This "jet age" calls for a lot of pipe . . API casing, tubing, and line pipe.

Lone Star Steel's great plant . . run by your friends and neighbors . . is turning out top quality API pipe and delivering it on the double to locations all over the busy Mid-Continent petroleum area.

Joe Roughneck, colorful symbol of the oil industry, likes to do business with Lone Star . . whether he's roughing it on a rig or calling the shots as head man of his company.

Neighbor, wherever you are, specify Lone Star . . . and we both get a good deal.

Lone Star STEEL COMPANY

LSS

EXECUTIVE-SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 8087 • Dallas, Texas

DISTRICT SALES OFFICES
Houston, Texas | Midland, Texas | San Antonio, Texas
Tulsa, Oklahoma | Wichita Falls, Texas | Shreveport, La.

Internal Lineup Clamp helps bring together two joints of 30" Republic Fusion Weld Line Pipe. Crews find that ends of Republic Line Pipe match up consistently, saving considerable installation time.

Welders like the uniform distribution of metal in the walls of Republic Line Pipe. It provides a good solid base for the root weld, guards against thin spots that might burn through, causing delays.

REPUBLIC CASING AND TUBING GOES IN FAST, TOO. The uniform roundness of these quality products, plus clean, full-formed threads assure fast stabbing, spinning and tonging-up. Uniform thickness of steel under the thread roots guards against disastrous pullouts. And the high-yield strength steel is extremely resistant to collapse. Republic makes both Electric Weld (in grades H-40 and J-55), and Seamless (J-55 and N-80). Order from your Republic Distributor.

THIS PIPE WELDS WITH A BRUSH, can be cut with an ordinary handsaw. It's Republic's Semi-Rigid Butyrate Plastic Pipe—the lightweight, easy-to-handle pipe that joins quickly—reducing installation costs. Moreover, it resists soil corrosion, electrolytic action—plus costly paraffin buildups. Ideal for transmission of high paraffin crudes, sour crudes, salt water and raw gas. Send coupon for facts. Also ask for information on Republic's new addition—Semi-Rigid Kralastic.

REPUBLIC'S LINE PIPE LINEUP IS TOUGH TO BEAT

Uniform roundness and straightness assure quick alignment—fast welding

No matter what size the pipe—or how long the line—installers appreciate the consistent uniformity of Republic Line Pipe. Jobs are completed faster, with less difficulty. Laying schedules can be set, knowing that they'll be met—and often bettered.

Take Republic Electric Fusion Weld Line Pipe, for example. No time is lost searching for true-fitting ends. Because circumference is always constant, field joints line up accurately. As a result, the entire perimeter can be welded at top speed.

Good welds are easy to make, too. Since uniform wall thickness assures an even distribution of metal all around the pipe, you can count on dependability in every inch of the line—with no thin spots to worry about.

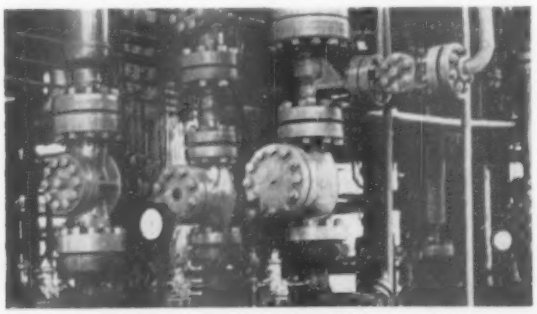
Republic Electric Resistance Weld Line Pipe enjoys these same high standards of quality. Due to its highly ductile steel, it also bends uniformly and smoothly in the shop or field. And a uniform high-yield strength makes both of them ideal for building high-pressure lines.

Specify this dependably straight, scale-free line pipe for your next job. Electric Resistance Weld comes in sizes 2⅜" through 16" O.D. and Electric Fusion Weld from 24" through 30" O.D. Republic's old standby, Continuous Butt Weld, is also available in sizes ⅛" through 4" nominal.

Let Republic help you with your transmission, gathering, distribution, and product line problems. Call us—or send coupon for descriptive literature.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products



YOU CAN COUNT ON MAXIMUM PROTECTION for your high-pressure equipment when you use Republic Alloy High-Resistant Steel Studs. Clean, accurate threads with ample full-engaged thread area—together with top-quality Republic alloy steels—mean dependable strength and performance—even under extreme pressures, extreme heat and corrosion. Specify Republic Alloy High-Resistant Steel Studs on your next order. And keep a supply on hand for your replacement needs.

REPUBLIC STEEL CORPORATION
3112 East 45th Street
Cleveland 27, Ohio

Please send me literature on:
☐ Republic Line Pipe ☐ Republic Casing and Tubing
☐ Republic Alloy Studs
Republic Plastic Pipe: ☐ Butyrate ☐ Kralastic

Name_____ Title_____

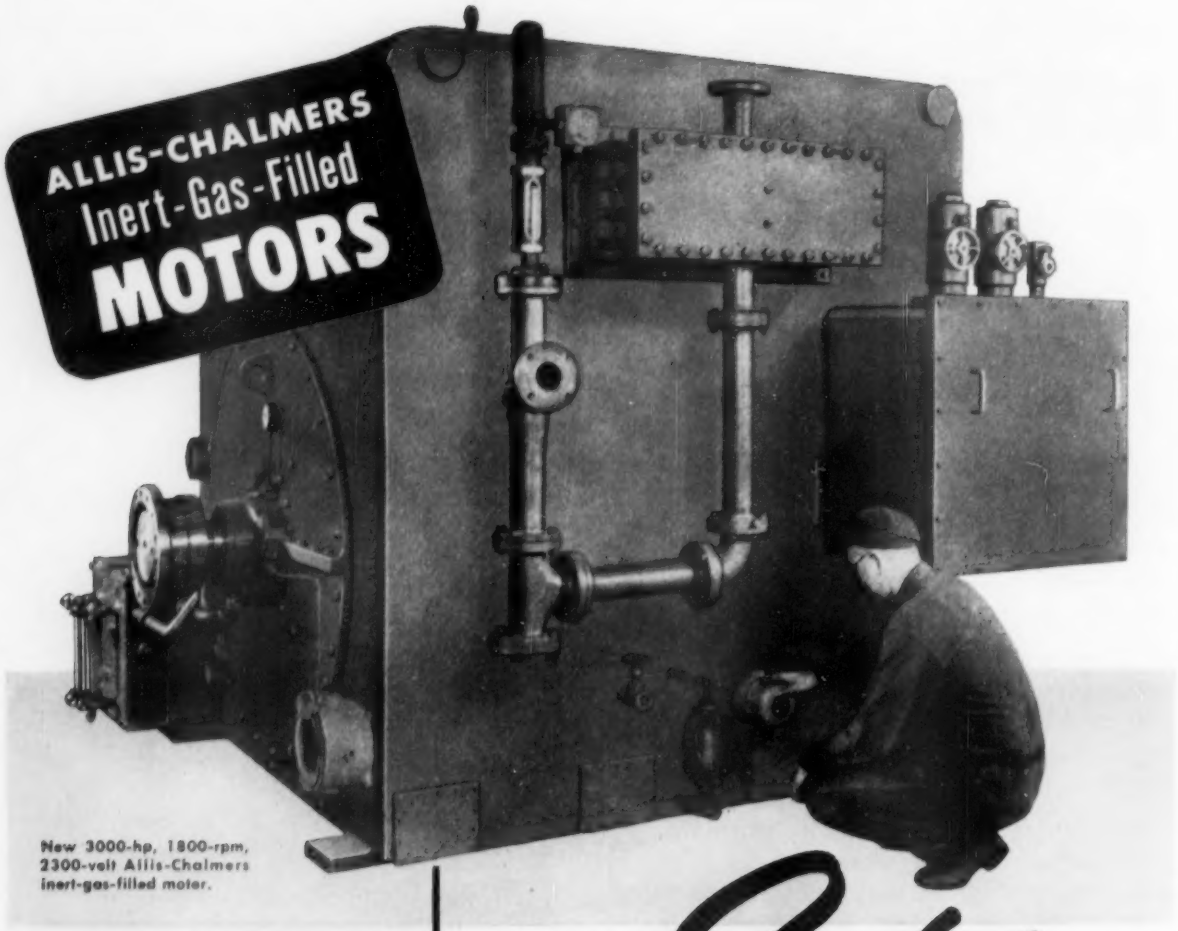
Company_____

Address_____

City_____ Zone_____ State_____

K-5409-A

ALLIS-CHALMERS
Inert-Gas-Filled
MOTORS



New 3000-hp, 1800-rpm, 2300-volt Allis-Chalmers inert-gas-filled motor.

For Hazardous Areas

Get *Safety* with Economy!

These motors have been found ideal for driving high speed compressors in refineries. An inert-gas atmosphere is maintained inside the enclosure of the motor. The non-explosive gas is held under positive pressure and keeps out volatile surrounding gases that could cause an explosion.

Air-to-water surface heat exchangers remove heat of motor losses. Special oil seals on shaft extension prevent gas leakage outward along the shaft.

These motors are available in a wide range of ratings in larger sizes. Ask the A-C office in your district, or write to Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS CHALMERS

ALLIS-CHALMERS

A-4825

of internal combustion engine in 1892. It was Adolphus Busch who early recognized the possibilities of the diesel engine and who right here in St. Louis pioneered the first commercial manufacture of that engine . . .

"Ranking with these is the outstanding momentum imparted to aviation progress by the 'Spirit of St. Louis' and the young man who flew with the sponsorship of businessmen of this city. . . .

". . . So from St. Louis' efforts and energy on three fronts, the oil industry has been blessed with great business opportunities, sales of gasoline, diesel fuel, and lubricants. . . ."

P. C. Spencer, Sinclair Oil Corp. president, in address to St. Louis Chamber of Commerce and Oil Men's Club of St. Louis.

Pinch Being Felt

"The wells in Oklahoma and surrounding states are so severely prorated in order to make room for additional imports that the stability of the industry and income for search for new productions is dangerously threatened. . . ."

Sen. Mike Monroney in letter to Mobilization Director Arthur S. Flemming.

Poor Highways Costly

"The retarding factor in these industries' (autos and oil) greater expansion is the lack of modern highways, and that shortage must be laid to government—to the lack of initiative and planning in local, state, and federal governments.

"Competent authorities representing both government and industry have compiled figures to prove that the frightful cost of highway accidents, the increased wear and tear on motor cars, and the great waste of gasoline and engine troubles resulting from idling engines due to highway congestion, comprise a burden on the motoring public which is far in excess of all the carrying costs which would have been involved if our local, state, and federal governments had lived up to their responsibilities and provided the necessary highways.

"The president of General Motors estimates that the unnecessary costs imposed by highway deficiencies is over 5 billion dollars a year. Because these highways needs were not foreseen, private property must be summarily condemned, modern buildings must be torn down, and commercial and industrial operations disrupted—with the dismal consequence that the cost to the taxpayers is several times what it should have been.

"In the last session of Congress, the roadbuilding program became a poltical

Otis – First In Pressure Control
OTIS
FIRST IN THE PETROLEUM INDUSTRY
Otis "Selective" Cross-Over Chokes For Two-Zone Wells

Meet your production EQUIPMENT SPECIALISTS *in* Kansas

When you need equipment for your next well, call your Union Tank sales and service man. DAY OR NIGHT, his years of experience are available to help you solve the production equipment problems on your leases. This service, combined with dependable Union Tank production equipment means a more profitable operation to you. That's why it will pay you to know the following men:

E. E. McDonald
Regional Manager
Great Bend, Kansas

R. W. Hoover
District Manager
Great Bend, Kansas

K. S. Dannenfelser
Great Bend, Kansas

E. L. Brumbaugh
Great Bend, Kansas

Johnny Brehm
Russell, Kansas

J. L. Crowder
Wichita, Kansas

When your next well comes in, call Union Tank for fast, skillful service with dependable follow up on . . .

Welded steel tanks	Indirect heaters
Bolted steel tanks	Emulsion heaters
Wood tanks	Heater tanks
Stairways, walkways	Heater-treaters
Texsteam pumps	Cold sep. & dehyd. units
Vertical separators	Valves and regulators
Horizontal separators	Loading racks

UNION TANK AND SUPPLY COMPANY

P. O. Box 2092, Houston, Texas

Subsidiary of Butler Manufacturing Company
Kansas City, Missouri

football which was kicked around by irresponsible legislators who finally walked away from it without taking any decisive action.

"They found time to raise their own salaries fifty per cent, increase their tax-free expense allowances, and plan publicly-paid junkets throughout the world. They are now so scattered abroad that the President expressed doubt about obtaining a quorum for a special session in case of a national emergency, such as faced us when the hurricanes hit the North Atlantic States in August."

Willard F. Rockwell, board chairman of Rockwell Manufacturing Co., in address to California Natural Gasoline Association, Los Angeles.

CALENDAR

1955

NOVEMBER

13-18	American Society of Mechanical Engineers, 75th anniversary meeting, Hilton and Blackstone Hotels, Chicago.
14-17	American Petroleum Institute, 35th annual meeting, Mark Hopkins, Fairmont, St. Francis and Palace Hotels, San Francisco.
18	Southern Gas Association, Transmission Section round-table conference on natural-gas drilling and production, Shamrock Hotel, Houston.
18-19	Society of Exploration Geophysicists, Southwest regional meeting, Dallas.
27-29	New Mexico Oil and Gas Association, Albuquerque, N. Mex.
27-30	American Institute of Chemical Engineers, annual meeting, Statler Hotel, Detroit.

DECEMBER

1-3	Interstate Oil Compact Commission, La Fonda Hotel, Santa Fe, N. M.
1-3	American Chemical Society, 11th southwest meeting, Shamrock Hotel, Houston.
2	Natural Gasoline Association of America, Panhandle - Plains meeting, Herring Hotel, Amarillo, Tex.
3	National Oil Scouts and Landmen's Association, annual meeting of board of directors, Adolphus Hotel, Dallas.
8-9	Oil Industry Information Committee meeting, Biltmore Hotel, New York City.

1956

JANUARY

9-13	Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich.
16-18	Pipe Line Contractors Association, eighth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

FEBRUARY

15-17	National Association of Corrosion Engineers Short Course for Pipeliners, Mayo Hotel, Tulsa.
19-23	American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York City.
24	Natural Gasoline Association of America, Permian Basin meeting, Lincoln Hotel, Odessa, Tex.
26-29	American Institute of Chemical Engineers, Statler Hotel, Los Angeles.
27-29	American Association of Petroleum Geologists, Rocky Mountain Section, Auditorium, Denver.

"PRECISION" in your laboratory

Your laboratory is faced with many and varied research problems. Precision Scientific Company manufactures more than 1,500 laboratory equipment items to make your job easier, faster, more productive and economical. And IMMEDIATE DELIVERY is standard!

When you specify PRECISION products, you give your laboratory the equipment quality and performance it deserves—no matter what the item or its price range. That you can always DEPEND ON PRECISION is our primary objective.

The "Precision-Built" Equipment Line Includes:

PENETROMETERS: For the most stringent penetration testing procedures. Embodies features recommended by prominent scientists. Structural rigidity, accuracy, sensitivity, simple operation are key features. Two models available.

R.V.P. BOMBS: For ASTM method D 323 and D 1267. New improved design of stainless steel in Pressure or Immersion models. Easily assembled by hand. Adapter available for Liquified Petroleum Gases. Set of 5 Reid Bomb gauges cover the series of ranges in pressures from 0 to 60 lbs. Gauge for L.P.G. up to 250 lbs.

REID VAPOR PRESSURE BATHS: ASTM methods D 323 and D 1267. Stainless steel models for 3 or 5 bombs. Merc-to-Merc thermoregulator preset at 100°F. accurate to —0.1°F. Electronic relay. Low-Drift immersion heater.

GREASE WORKING MACHINES: For ASTM D 217 Specs AN-G-15-a and AN-G-25 hand and motor driven and automatically controlled by a pre-setting counter. Three models.

Precision Scientific Company

3753 West Cortland Street, Chicago 47

AUTOMATIC DISTILLATION APPARATUS

•

NEW

•

ACCURATE

•

RUGGED

•

DEPENDABLE

Proven 24-Hour-a-Day Operation – Month after Month

GASOLINE • KEROSENE
NAPHTHA • ESTERS
LACQUER SOLVENTS
THINNERS
CRUDE PETROLEUM
GAS OILS
FUEL OILS • DIESEL FUELS
PLANT SPRAY OILS
JET FUELS
AVIATION GASOLINE
BENZENE • TOLUENE
XYLENE
FARM TRACTOR FUELS
PETROLEUM SPIRITS
TURPENTINE

Specifically designed to fully comply with the dictates of ASTM D 86, "Distillation of Gasolines, Naphtha, Kerosenes, and Similar Petroleum Products", the ADA Instrument, nevertheless, automatically distills every one of the above products.

WORK OUTPUT

150 Distillations . . . even more per man per day

ACCURACY

Volume to .075 ml.
Temperature: 0.75° F.

PERMANENT RECORD

Every Second of Every Test Recorded

REPEATABILITY

Standard Deviation between runs 1.085° F.

SIMPLE TO OPERATE

No clock to watch
No temperature to read
No volume to read

Ask for Bulletin No. 730

Available for Immediate Delivery From Stock

Precision Scientific Company

3753 WEST CORTLAND STREET • CHICAGO 47

General American

offers you the best in

All types of Floating Roofs

WIGGINS HIDEK*

This is the natural design for storage of volatile products. A variable volume of vapor trapped beneath the steeply-pitched, quick-draining deck adds to its efficiency.

WIGGINS LODEK*

Designed so that the underside is in complete contact with the liquid surface. No vapor space can exist beneath the floating roof. Especially recommended where corrosive products are stored.

WIGGINS DOUBLEDEK*

If you prefer a double-deck roof choose the best—the new Wiggins Doubledek. Complete drainage design and between-deck accessibility add up to unmatched efficiency and safety.

WIGGINS FLOATING ROOFS PAY FOR THEMSELVES

Whatever your Floating Roof requirements get General American's UNBIASED analysis. Unbiased because General American makes ALL types of Floating Roofs!

Wiggins Floating Roofs, Dry Seal Gasholders, Lifter Roofs, Cone Roofs

*patented

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street • Chicago 90, Illinois

The OIL AND GAS JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone Diamond 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

P. C. LAUINGER
President

S. H. ROURKE
Executive Vice President

MITCHELL TUCKER
Vice President and Advertising Manager

HANSON B. PIGMAN
Circulation Manager

DONALD W. WILSON
Manager Industry Census Department

J. PARKER HOLLAND
Production Manager

ADVERTISING OFFICES

TULSA
211 South Cheyenne, Diamond 3-6291
JOHN D. REILLY — Mid-Continent Manager
HARRY B. BULLEN — Representative

NEW YORK
500 Fifth Avenue, LOngacre 4-6160
CHARLES A. WARDLEY — Eastern Manager
JAMES W. BROWNLEE — Representative
JOHN W. MEANY, JR. — Representative

CHICAGO
105 West Madison Street, CEntral 6-2537
E. S. KLAPPENBACH — Midwestern Manager
DAVID T. KENNEY — Representative
JOHN D. YODER — Representative

PITTSBURGH
106 Nelbon Avenue, FRemont 1-7775
ALFRED M. JONES — Manager

HOUSTON
Sterling Building, CA 4-7726
JOHN M. SPEARS — Gulf Coast Manager

DALLAS
1238 Mercantile Bank Building, STerling 3074
GEORGE O. RUPPERT — Representative

LOS ANGELES
650 South Grand Avenue, VAndike 0722
DONALD O. HANSON — Manager

ENGLAND
National Provincial Bank Chambers,
15 Grafton Street, Altrincham
Phone Altrincham 3160
HARRY BECKER — European Representative

•

Subscription rates to the petroleum industry, United States and foreign, 1 year, $4.00; 2 years, $7.00; 3 years, $8.00. Single copies: regular issues 50 cents; special issues $1.00. Back copies when over a year old, $1.00. Note: Payments from outside the U.S.A. may be made by international money order, New York Exchange, or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1955 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY SPEAKING . . .

Like Tomato Juice?

OUR circulation manager is a clever one, and indefatigable when it comes to thinking up new ways to induce oil men to plunk down four bucks for a season's pass to our favorite oil publication.

Currently he's giving his prospects the tomato-juice treatment.

His sales pitch starts out with a homely little anecdote, artfully designed to warm the cockles of any parental heart, about his troubles in getting his infant daughter to drink tomato juice. (He really does have a daughter, but you'll have to take his word for the rest of the story.)

With obviously inherited subbornness, this determined little lady persistently refused to take even a teeny-weeny sip of the tart red stuff for no other reason than: "I don't like it." In vain Papa and Mama pressed the adult logic that she couldn't know she didn't like it if she never had tried it.

Finally the desperately vitamin-conscious parents resorted to bribery. They offered her a handsome prize if she would try a sample. She liked it, is now a regular subscriber to tomato juice, and they all lived happily ever after.

This is where he sticks in the needle, as you may guess. Having softened up the unsuspecting prospect with this touching tale of domestic difficulties, he asks him how does he know he dosn't like our Big Yellow Book if he hasn't tried it, and if he will just initial that dotted line he will get not only a generous trial sample of our vitamin-packed magazine but also a reward in the form of a book on corrosion and what to do about it. (Note: This book deals strictly with corrosion of oil pipes; it contains nothing whatever about the effect of tomato juice on combating corrosion of your own pipes caused by throughput of certain taxable beverages.)

Now this letter was supposed to go only to people who think they don't like tomato juice—er, we mean The Oil and Gas Journal—because they have never tried it. But somebody on the night shift on the addressing machine let a copy slip through to a subscriber. So our Circ. Mgr. gets this reply:

"Dear Mr. Pigman:

"I like tomato juice. I drink it. I don't remember when I didn't like it. It is even good with vodka in it, although it has a terrible name which I believe is 'Bloody Mary.'

"I also like The Oil and Gas Journal. I can't remember when I didn't like it, and I have been a loyal and faithful subscriber many years.

"I'll make a deal with you. I'll continue to be a subscriber if you'll take my name out of the 'sucker' list.

"I got quite a kick out of your letter."

Pigman got quite a kick out of his letter, too. And he is double-checking to see that this gentleman's name is removed from the—er—prospect list. We can't waste good tomato juice.

Like San Francisco?

SEVERAL thousand of our readers will be at the A.P.I. meeting in San Francisco when this issue hits their desks, but many more thousands of you will be plugging away at the old routine.

For those in the latter category, this issue is a sort of consolation prize. You've already noticed that it is extra thick. This is because it contains a lot of special features—articles of a type and variety not frequently found in our regular issues. We've been preparing them for many months, just for this "pre-A.P.I." number.

And from what we hear about conditions in the city of the Golden Gate, what with the A.P.I. being spread around among hotels all over that hilly town, you may pick up more good dope this way than if you had gone.

At any rate, your Journal reporters will be there en masse—one man for each hotel—and next week you'll get a full report. We won't be able to fill you in on the scenery, the night spots, and other attractions not listed on the official program, but we will bring you the essential information, hot off the griddle, next Monday.

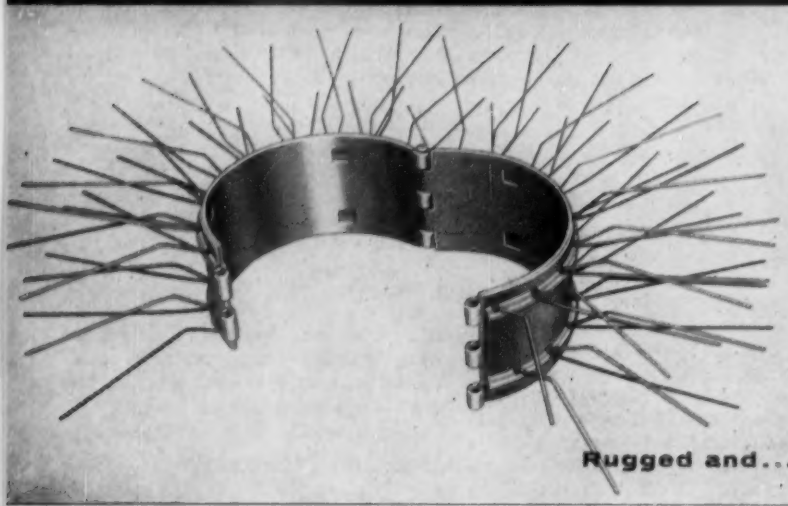
So spend this week reading all the good dope in this issue and get ready for another big meal next week.

—*Henry D. Ralph.*

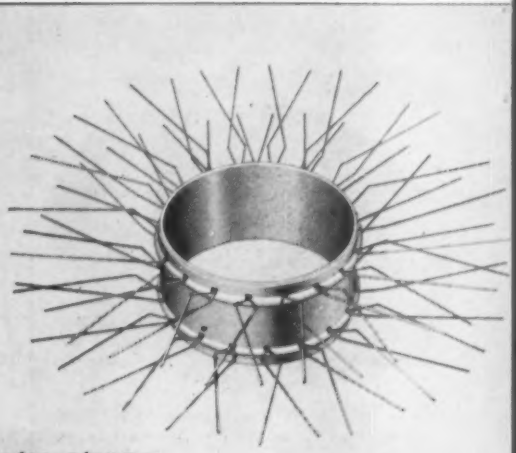
A completely new BAKER
WALL SCRATCHER

that removes mud cake effectively...
but only from the area to be cemented

MODEL "C"
HINGE-LOK
PRODUCT NO. 900-C



MODEL "C"
SOLID-RING
PRODUCT NO. 901-C



Rugged and... extra strong

Controlled Scratching—Baker Model "C" Wall Scratchers really remove mud cake, but only from the area to be cemented. The vital and expensive filter cake built up on areas outside of the cementing area is left practically undisturbed.

Greater Efficiency—Double row of wires, overlapped for added strength, provide more scratching points for more efficient removal of mud cake and complete coverage of the 360° surface of the well bore.

Greater Strength—Ruggedly built to deliver maximum performance. Double shell for added thickness and strength. Double ridges formed in shell for added rigidity. Hinge in Hinge-Lok Model, which is formed as part of inner shell, is backed up and given greater strength by outer shell.

Two-Ranges Available—Two wire lengths for each casing size. 4½" length (C-45) for normal clearance programs; 2½" length (C-25) for "slim hole" clearances.

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

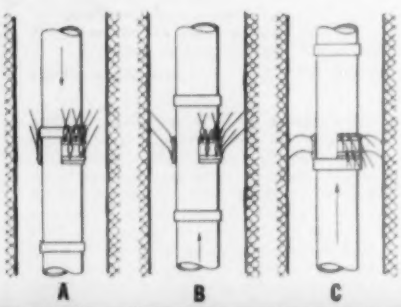
Contact your nearest Baker Representative or write today for further information about . . .

How Controlled Scratching Works:

A As the casing is run down the hole the Scratcher Wires lay nearly flat against the casing and thus leave the expensive and vital filter cake built up on areas other than the cementing area virtually undisturbed.

B Lifting the casing out of the slips does NOT activate the Scratcher Wires since the Scratcher remains stationary due to the approximate three-foot interval between stop rings.

C When the casing is raised a distance greater than the spacing between the stop rings during the scratching operation, the Scratcher Wires engage the formation and scratch to remove mud cake.



BAKER
WALL SCRATCHERS

All signs point to the best year ever

NEXT year is going to be the biggest year the petroleum industry ever had. All forecasts, all business indicators, all plans of individual companies point to increased activity in every division.

The increase in demand—expected to be in the neighborhood of 4 per cent—will not be as large, percentagewise, as 1955 was over 1954. But this is chiefly because 1954 was a poor year. It took a big hump to get back on the long-time trend. Now we are back, and all signs point to the kind of healthy growth the industry considers normal.

At the industry's current rate of activity, a moderate percentage increase translates into huge number of barrels, units, and dollars. Every operator will be kept busy just to hold his place in the parade.

MORE WELLS WILL BE DRILLED than ever before, and expenditures for exploration and production will go up even more in proportion than footage drilled. Whopping budget increases are being planned by many companies for oil and gas pipelines, gas-liquids processing, refinery expansion, and other capital improvements.

This general growth should alleviate a good many of the industry's pains of recent years. Products markets should be firmed under the higher demand. Refining capacity, even with the scheduled expansions, should not be burdensomely excessive.

Domestic crude production undoubtedly will reach an all-time high. This will ease proration restrictions and put to work at least some of the unused producing capacity. This will take place even if imports are not held down quite to the recommended level.

THE OUTLOOK ISN'T ALL PURE VELVET, of course. A threatened scarcity of steel may force operators to use all possible ingenuity to maintain their drilling programs. The usual number of sore spots in marketing can be expected. Margins of many refiners and marketers may remain uncomfortably narrow.

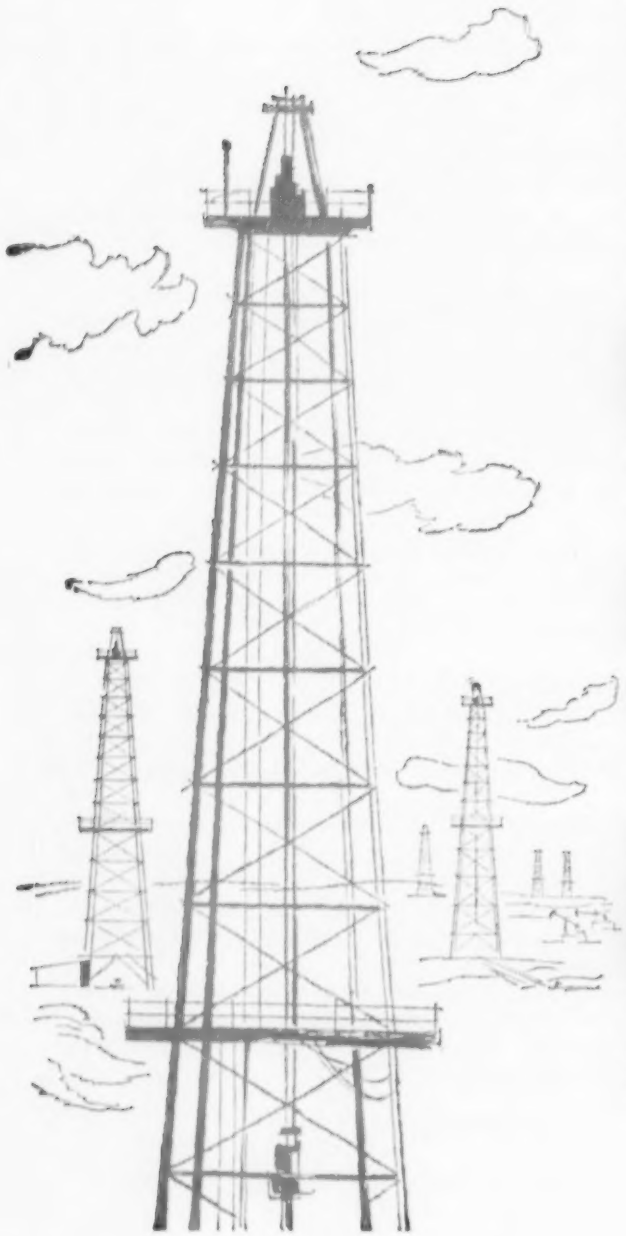
Political harassment shows no signs whatever of diminishing in 1956. State and federal investigating bodies can be counted on to belabor the oil and gas business on many sides. And if Congress fails to remove federal price control from gas producers, expansion of gas transmission will slow down after completion of current construction based on reserves dedicated before the Government stepped in.

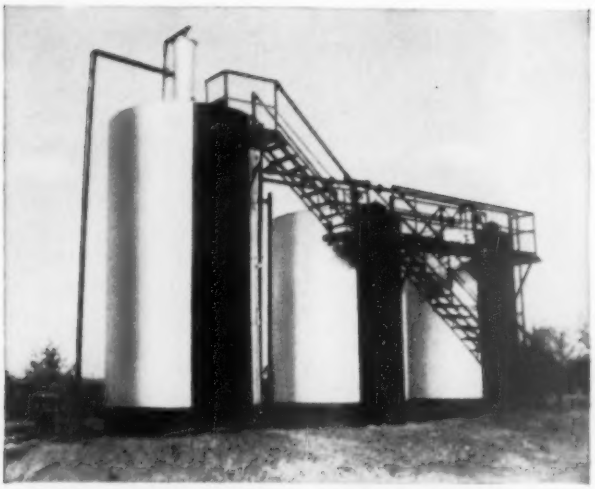
The biggest long-range worry of the industry is the problem of finding new reserves to replace those now being drawn on. Increasing demand makes the need even more imperative. But at the same time this hastens the day when the market will support prices sufficient to encourage greater exploratory effort.

On the whole, it looks like good times ahead.

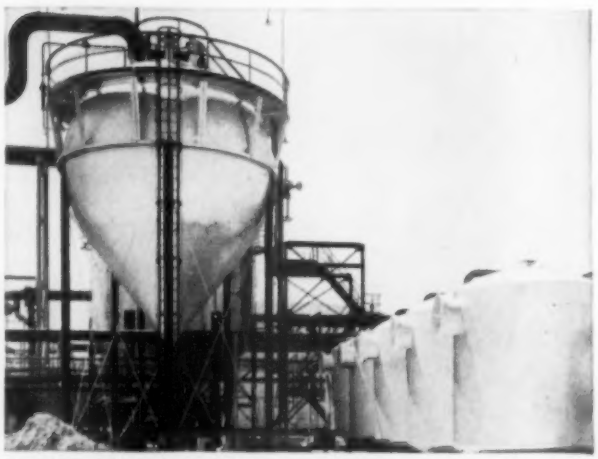
GRAVER Serves the Petroleum

from well-head





From nine strategically located cities GRAVER'S MID-CONTINENT DIVISION sells Graver-fabricated lease tanks, walkways, oil and gas separators, heaters, and other well-head equipment.



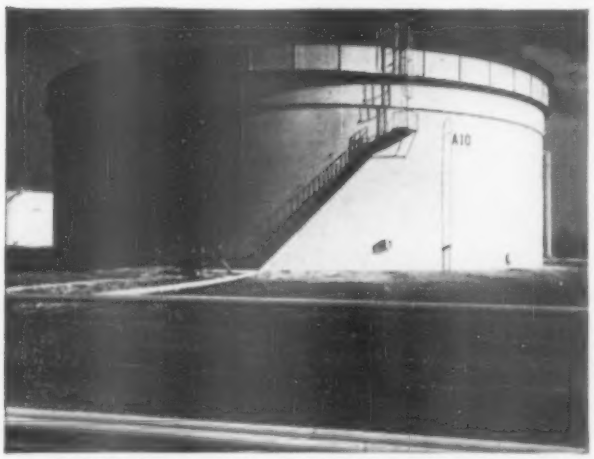
The Graver Sphericone Hot Process Softener, with or without hot zeolite after treatment, produces a safe boiler feedwater. GRAVER WATER CONDITIONING COMPANY also supplies standard hot process units and hot zeolite systems which can be added to existing hot process units.

Industry

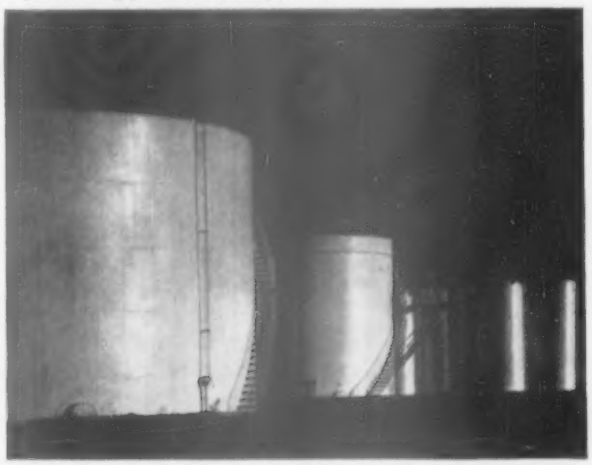
to market

GRAVER CONSTRUCTION COMPANY, INC., builds and maintains pipeline stations, refineries and other petroleum installations. *Guaranteed* customer satisfaction is a part of every Graver job.

GRAVER'S unequaled fabricating skill in steel and alloys is seen in the many towers and intricate process vessels constructed for the country's leading petroleum companies.



The GRAVER EXPANSION ROOF TANK represents the ultimate in modern conservation equipment. It is but one of Graver's many "tailor-made" designs that helps conserve petroleum products.



GRAVER serves the marketing needs of the Industry with the Double-deck and Center-weighted Floating Roof Tanks . . . with cone roof tanks . . . and shop-built tanks (to 30,000 gallons).

GRAVER TANK & MFG. CO., INC.

East Chicago, Indiana

CHICAGO • NEW YORK • PHILADELPHIA • EDGE MOORE, DEL. • CATASAUQUA, PA.
PITTSBURGH • CLEVELAND • DETROIT • TULSA • SAND SPRINGS, OKLA. • HOUSTON
ODESSA, TEXAS • CASPER, WYO. • LOS ANGELES • FONTANA, CAL. • SAN FRANCISCO

GRAVER®

When Hours Mean Dollars

Save with **Welex**

SIMULTANEOUS R/A LOGGING

If time *is* important to you, you'll save by calling on Welex for Simultaneous Radioactivity Logging. You'll end guessing, and be *sure* of your accuracy when all *three* curves are recorded in *one* logging run. Your log will give you clear, repeatable Gamma Ray and Neutron Curves easily adaptable to quantitative analysis — tied right in with your collar log. You'll save time — you'll save money with a Welex R/A Log.

Log three curves in one run

COLLAR LOG
GAMMA RAY
NEUTRON

Welex JET SERVICES, INC.

CALL WELEX AND BE SURE!

General Offices, 1400 E. Berry St., Fort Worth, Texas • **Sales Offices,** Alice, Dallas, Duncan, Lake Charles, Wchita • **Division Offices,** Houston, Midland, Tulsa, Oklahoma City • **District Offices,** Abilene, Ardmore, Bartlesville, Beaumont, Corpus Christi, Falfurrias, Farmington, Gainesville, Great Bend, Hobbs, Houston, Lafayette, Liberal, Odessa, Pampa, Pauls Valley, San Angelo, Shawnee, Snyder, Stillwater, Wichita Falls, Winfield

Current and significant in . . .

The Industry This Week

Economics

• **Journal forecast sets total demand** next year at 9,020,000 bbl. daily. This will be a 4 per cent jump over '55 and will mark the first time demand has exceeded 9,000,000 bbl. daily. Imports are expected to be 837,000 bbl. daily, resulting in a domestic crude production averaging 6,985,000 bbl. daily. P. 118.

Jersey Standard announces it is budgeting a whopping $1,200,000,000 for 1956. Figure is up 20 per cent from 1955 budget. P. 133.

Drilling

• **A new world drilling-depth record** is being set by Richardson & Bass at a partnership wildcat in the Mississippi delta marshes 35 miles southeast of New Orleans. The well was drilling ahead below 21,500 ft. late last week. Operators planned to drill at least to 22,500 ft. The test has broken the former depth record of 21,482 ft. and may establish records for deepest producer, deepest use of lime-treated muds, and longest string of casing. P. 130.

A platform capable of drilling in 300-ft. water has been designed for exploring the steep shelf off California. Designers say 21 wells can be drilled through supporting columns, that 15 sq. miles can be explored by slant drilling. P. 132.

Refining

• **New construction will make Suntide refinery** at Corpus Christi the biggest independent refinery in the country.

The work will step up capacity from 50,000 to 65,000 bbl. per day. The extra capacity is being achieved by a new preflash tower, larger crude and product pumps, expansion of fluid catalytic cracking and hydrofluoric acid alkylation units, and new preheat furnace. P. 128.

A.P.I.

• **The American Petroleum Institute opens its 35th annual meeting** today in San Francisco. More than 6,000 oil men are expected to attend. Before the 4-day gathering ends Thursday they will have discussed mutual problems and spotted trends at 160 committee meetings, 13 group sessions, 6 board and executive committee meetings and 2 general sessions.

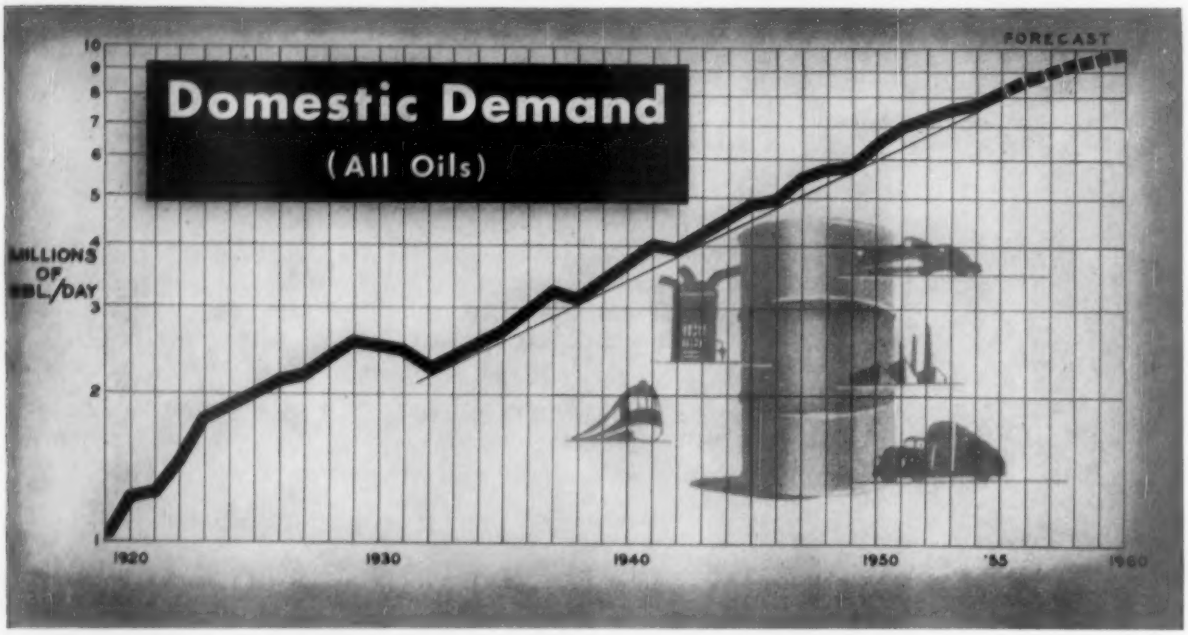
Production

• **Novel dual completions** are being used to beat casing corrosion in Oakville field, South Texas. Two gas zones are produced alternately for 15 days through a single string of tubing. A side-door choke shuts off the upper zone while the lower produces, and a separation tool permits flow from the upper zone. P. 139.

Exhaust gas will be injected in a pilot secondary-recovery project in Montana's Kevin-Sunburst field. Texaco is switching to gas after unsatisfactory results in its pilot water flood. P. 138.

Industry

• **Gulf is buying control of Warren Petroleum Corp.** Major Warren stockholders have agreed to exchange five shares of Warren for four of Gulf common stock. One group has agreed to accept less. Other stockholders will be offered the 4 for 5 deal. Warren will retain its identity and operate as a subsidiary. P. 129.



Demand in '56 to Break All Records

- Annual Journal forecast puts figure above 9,000,000 bbl. daily for the first time; increase of 4 per cent seen
- With imports at an estimated 837,000 bbl. daily, U. S. output of crude and gas liquids will be 7,747,000 bbl.

John C. Casper

DEMAND for petroleum products will reach an all-time high next year.

Total demand for all oils in 1956 is forecast at 9,020,000 bbl. daily. This will be a gain of 349,000 bbl. daily, or 4.0 per cent, over 1955. The gain won't be as big as the abnormal 7.0 per cent jump this year, but the big gain in 1955 is due to the fact that 1954 was a low-demand year.

If the forecast is borne out, 1956 will be the first year with a demand exceeding 9,000,000 bbl. daily. It would be even higher except for an expected further decline in exports.

Total exports of crude and products will average about 324,000 bbl. daily, compared with an estimated 359,000 bbl. daily in 1955. Exports have been declining gradually since 1951-52, when the loss of Iranian oil and the demands of the Korean war boosted shipments of crude and products from this country.

What about 1955? . . . Demand for petroleum in 1955 will exceed all industry forecasts published a year ago and even will top the revisions made last spring.

The lower forecasts for the year were based on average economic growth for the year. Part of the failure to forecast the wave of economic activity in 1955 was due at least in part to: Poor evaluation of the effect of credit regulations; and the inability to predict the amount of hoarded money that would be brought out and put to work under a better economic climate.

Oil-industry economists expect a high level of general business activity in 1956 but the rise will be much less than the boost in 1955.

Gross national product for 1955 is expected to total about 386 billions of dollars compared with 360.5 in 1954. Most forecasts for 1956 are based on a G.N.P. of about 392 to 394 billion. Industrial production in 1954 was 25 per cent above the average for 1947-49. The total for 1955 is expected to be about 38 per cent above the base period, climbing to about 40-42 per cent above for 1956.

The over-all economy will begin to react to credit restrictions late this year, but the current wave of activity has enough momentum to roll over into next year. Some relaxing of credit restrictions is expected early in the year, but this will not be in time to prevent a slight dip about the middle of the year. The effects from changes in credit regulations may lag by as much as 6 months.

The net effect of the actions and reactions will be a net gain in general economic activity in 1956 but not as much gain as in 1955.

What's ahead . . . Domestic demand will be up 4.6 per cent next year. The gain over 1955 will be 384,000 bbl. daily,

. . . It'll Keep Rising

Demand in 1960 will be almost 10,000,000 bbl. daily.

You'll note that the low points on the curve in the chart above lie very near a straight line drawn from 1933 to 1954. If this line were extended, it would cross the 10,000,000 bbl. scale by 1959.

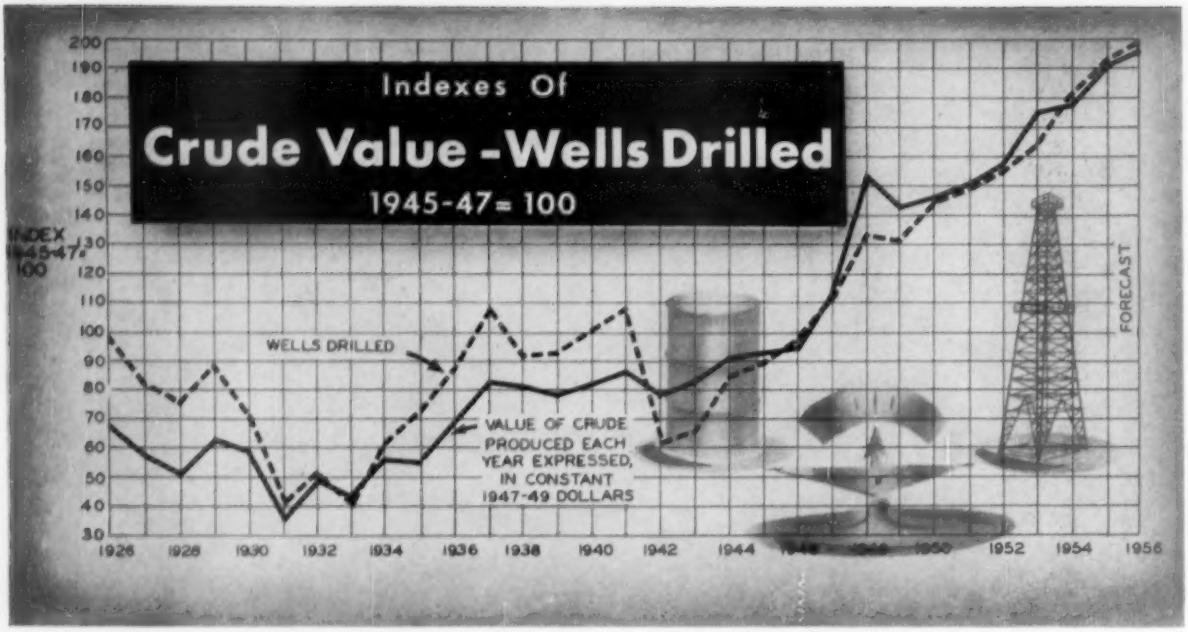
However, the slight curve in the broken line indicates that the annual percentage rate of increase for the next 5 years is expected to be slightly less than the average since 1933—and much less than the rate of growth from 1919 to 1929.

The chart is plotted on a semi-logarithmic scale. On such a scale, a straight line for a period of several years would indicate a constant percentage increase for each year in the period.

Supply and Demand: Petroleum Products in '56

(Thousands of barrels daily)

	First quarter		Second quarter		Third quarter		Fourth quarter		Year 1956	
DEMAND—	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change
GASOLINE:										
Total	**3,470**	**4.9**	**4,050**	**3.6**	**4,070**	**4.4**	**3,780**	**4.1**	**3,843**	**4.2**
Export	80	— 1.2	90	— 2.2	90	—18.2	80		85	— 6.6
Domestic	3,390	5.0	3,960	3.7	3,980	5.0	3,700	4.2	3,758	4.4
KEROSINE:										
Total	**480**	**— 1.4**	**175**	**6.1**	**200**	**— 6.5**	**460**	**2.7**	**329**	**0.3**
Export	10	11.1	10	— 9.1	10	—33.3	10		10	— 9.1
Domestic	470	— 1.7	165	7.1	190	— 4.5	450	2.7	319	0.6
DISTILLATE:										
Total	**2,430**	**6.5**	**1,225**	**6.1**	**1,225**	**9.4**	**2,120**	**6.0**	**1,750**	**6.9**
Export	50	— 5.7	65	— 4.4	75	— 8.5	60		63	— 4.5
Domestic	2,380	6.8	1,160	6.7	1,150	10.8	2,060	6.2	1,687	7.4
RESIDUAL:										
Total	**1,850**	**— 1.0**	**1,450**	**— 2.3**	**1,330**	**— 2.8**	**1,690**	**0.6**	**1,580**	**— 1.2**
Export	70	—33.3	70	—27.1	70	—14.6	70		70	—20.5
Domestic	1,780	0.9	1,380	— 0.6	1,260	—20.0	1,620	0.6	1,510	— 0.1
JET FUEL:										
Total	**180**	**20.8**	**190**	**23.4**	**190**	**21.8**	**210**	**23.5**	**192**	**22.3**
Export										
Domestic	180	20.8	190	23.4	190	21.8	210	23.5	192	22.3
LUBRICANTS:										
Total	**148**	**2.1**	**170**	**4.3**	**167**	**4.4**	**158**	**3.9**	**161**	**3.9**
Export	38	2.7	40	— 2.4	42		40		40	
Domestic	110	1.9	130	6.6	125	5.9	118	5.4	121	5.2
L.P.G.:										
Total	**467**	**8.6**	**357**	**9.2**	**375**	**9.6**	**450**	**9.2**	**412**	**9.0**
Export	13		12	9.1	12		12		12	
Domestic	454	8.9	345	9.2	363	10.0	438	9.5	400	9.3
OTHER PRODUCTS:										
Total	**540**	**6.9**	**790**	**7.3**	**860**	**1.3**	**610**	**5.2**	**700**	**4.8**
Export	19	5.6	20	— 4.8	20	—13.6	18	— 5.3	19	— 5.0
Domestic	521	7.0	770	7.7	840	1.6	592	5.5	681	5.1
CRUDE:										
Total	**55**	**— 1.8**	**50**	**—29.6**	**50**	**—21.9**	**55**	**10.0**	**53**	**—11.7**
Export	25	4.2	25	—37.5	25	—24.2	25		25	—19.4
Loss	30	— 6.2	25	—19.4	25	—19.4	30	25.0	28	— 3.4
ALL OILS:										
Total	**9,620**	**4.2**	**8,457**	**3.6**	**8,467**	**3.6**	**9,533**	**4.5**	**9,020**	**4.0**
Export	305	—10.3	332	—12.6	344	—13.6	315	— 0.3	324	— 9.2
Domestic	9,315	4.8	8,125	4.4	8,123	4.5	9,218	4.7	8,696	4.6
STOCK CHANGE:										
Total	**—440**		**410**		**425**		**—233**		**40**	
Crude	25		60		25				27	
Products	—465		350		400		—233		13	
SUPPLY—										
NEW SUPPLY:										
Total	**9,180**	**3.0**	**8,867**	**3.8**	**8,892**	**4.8**	**9,300**	**4.8**	**9,060**	**4.1**
PRODUCTION:										
Total	**7,780**	**2.8**	**7,637**	**3.2**	**7,692**	**4.6**	**7,880**	**4.2**	**7,747**	**3.7**
Crude	7,000	2.5	6,900	2.6	6,940	4.3	7,100	4.1	6,985	3.4
Natural, etc.	780	5.4	737	8.7	752	7.7	780	5.4	762	6.7
IMPORTS:										
Total	**1,400**	**3.9**	**1,230**	**7.9**	**1,200**	**6.1**	**1,420**	**8.4**	**1,313**	**6.6**
Crude	825	10.9	800	8.8	850	5.5	870	6.1	837	7.7
Products	575	— 4.8	430	6.2	350	7.7	550	12.2	476	4.6
RUNS TO STILLS	**7,727**	**4.0**	**7,570**	**3.7**	**7,697**	**1.9**	**7,897**	**4.9**	**7,723**	**3.6**
STOCKS (millions of barrels):										
Total	**687.6**		**724.9**		**764.0**		**742.6**		**742.6**	
Gasoline	188.0		166.0		153.3		170.4		170.4	
Kerosine	17.6		27.9		38.4		28.3		28.3	
Distillate	66.5		103.2		144.1		119.8		119.8	
Residual	40.1		45.8		50.7		50.0		50.0	
Other products	113.7		114.8		108.0		104.6		104.6	
Crude	261.7		267.2		269.5		269.5		269.5	



bringing the average for the year to 8,696,000 bbl. daily.

Here is the 1956 demand outlook by products:

. . . **Gasoline:** Domestic demand for gasoline is expected to average 3,758,000 bbl. daily, a gain of 4.4 per cent over 1955. This compares with the increase of 6.1 per cent now projected for 1955.

The big demand growth in 1955 had its foundation in the rapidly expanding base which promoted more spending for travel and for new cars.

Automobile manufacturers will make about 8,000,000 passenger cars this year, but exports and additions to dealers stocks will account for about 600,000 of the total. The remaining 7,400,000 sold to domestic trade is about 1,000,000 cars more than the record set in 1950. Sales then were boosted by scarce buying because of the trouble developing in Korea.

Despite the optimistic production goals outlined by car makers, some economists expect car sales in 1956 to drop well under this year's record. Unless there has been an immeasurable shift in the automobile market, some of the new car sales in 1955 were to potential new-car customers of 1956.

. . . **Kerosine:** Very little increase in demand for kerosine is forecast for 1956.

Domestic demand has grown little since the war. The average for this year will be only about 3.3 per cent greater than in 1948 and about 7,000 bbl. daily less in 1954.

. . . **Distillate:** Since better than 55 per cent of all distillate fuel is used for heating, the weather this winter will be an important factor in determining demand.

For the period from 1934 through 1954, the number of oil burners used for heating increased at the rate of 10.6 per cent a year. At the end of 1954 there were 7,582,000, and some burner manufacturers are predicting a net increase of 700,000 burners this year.

Others believe this figure is too high. Sales so far this year have been high enough to assure a good increase in distillate demand even with weather no colder than last winter.

Domestic demand for distillate in 1956 is forecast at 1,687,000 bbl. daily, an increase of 7.4 per cent over the 1955 average. The slight drop expected in distillate exports lowers the gain in total distillate demand to 6.9 per cent.

. . . **Residual:** Domestic demand for residual fuel next year will be at about the same level that was reported for 1950 and practically unchanged from this year.

Residual demand increased just after World War II, from 1,315,000 bbl. daily in 1946 to 1,517,000 bbl. daily in 1950. It has changed very little since then except for the 6.9 per cent decrease in 1954.

Residual has lost most of its railroad market since World War II. The number of diesel locomotives in use today is more than five times the total for 1946. Also, natural gas has replaced residual at some electric power plants during the summer.

The gain in 1955 represents a return to normal under the influence of increased industrial activity that has pushed the index up to 138. The small net gain in industrial production next year will no more than offset losses from decreased sales to other users of heavy fuel.

. . . **L.P.G.:** Domestic demand for L.P.G. increased at the rate of 14.4 per cent a year for the period 1946-55, but many of the big-gain years were early in the period. However, demand for 1956 is forecast at 400,000 bbl. daily, based on normal winter weather.

Continued expansion of domestic sales will depend on programs for moving more L.P.G. by pipelines and on how much success marketers have developing underground storage along these lines.

. . . **Other products:** A large part of the gain forecast for miscellaneous products will come from increased demand for asphalt and road oils, but recently installed coking units will account for some of the gain.

Stock changes . . . Stock changes, forecast for next year, are based on normal operations both for production and refinery runs.

Actual data for next year may vary more from the forecast by quarters than for the entire year. The over-all build up of inventories in the third quarter of this year was not much out of line, but the breakdown between crude and products was abnormal.

Refinery runs for the third quarter were so high, and the additions to distillate inventories were so rapid, that demands for the fourth quarter can be met without raising runs above the third-quarter level.

These high refinery runs resulted in an average draft on crude stocks averaging 172,000 bbl. daily for the third quarter. Additions to product inventories averaged about 484,000 bbl. daily.

Operations for next year can be balanced with additions to crude stocks averaging 27,000 bbl. daily and a gain in refined products of 13,000 bbl. daily. Total stocks at the end of September next year will be almost 14,000,000 bbl. more than this year, but most of the gain will be in crude. Crude was at least 14,000,000 bbl. low at the end of September this year.

New supply . . . Total new petroleum supply for this country will average more than 9,000,000 bbl. daily for the first time in 1956.

The breakdown of supply by sources should not be considered a recommendation but an estimate of the most probable division, based on information available at this time.

. . . Imports: Imported crude for 1956 is forecast at 837,000 bbl. daily for a gain of 60,000 bbl. daily or 7.7 per cent.

The most recent releases by the director of the Office of Defense Mobilization indicate that Canada and Venezuela may be excluded from any proposed crude-import restrictions. This fact may make it more difficult to cut total crude imports next year.

Total West Coast crude imports from Canada plus the crude brought in for the new refinery in Minnesota will average about 38,800 bbl. daily this year. This is based on actual imports through August and company estimates for the rest of the year.

Full operation of these refineries will call for at least 85,000 bbl. daily in 1956. Thus, full operation in 1956 compared with part year in 1955 will add at least 46,200 bbl. daily to the year's average of crude from Canada.

The remaining forecast increase of 13,800 bbl. daily represents gain likely to come in making adjustments among supply areas. If crude imports for the year drop below 837,000 bbl. daily, the amount of the cut can be added to the forecast average for domestic crude production.

Product imports, mostly heavy fuel, will be limited by tight supply in the Caribbean in the early months of the year and by lower demands in this country in the last half of 1956. The average for the year is forecast at 476,000 bbl. daily for a gain of 4.6 per cent.

. . . Production: Production of crude and natural-gas liquids will average 7,747,000 bbl. daily if imports come in at the rate indicated above.

This will be made up from 6,985,000 bbl. daily of crude and 762,000 bbl. daily from natural-gasoline and cycling plants.

On this basis, crude production may average 7,000,000 bbl. daily in the first quarter and climb to 7,100,000 bbl. daily in the fourth quarter. These crude-production and import rates provide for a gain in crude stocks of about 10,000,000 bbl.

Refinery runs . . . If demands reach the forecast level, refinery runs for the year will need to average 7,723,000 bbl. daily. This rate will provide for an increase of about 4,700,000 bbl. in product inventories.

Processing at refineries and plants next year will be basically related to the increases in refinery runs and production at natural-gasoline and cycling plants. Runs will be up 3.6 per cent and plant output will gain 6.7 per cent.

However, the changes in processing will call for increasing capital expenditures for new units. From October 1954 to October 1955, refiners raised the average octane of premium gasoline a little over two octane numbers and regular a little less than two numbers.

There is every indication that this upward trend will continue, with the accompanying expenditure of hundreds of millions of dollars for new equipment to add this extra quality.

Drilling . . . In addition to the all-time records in demand, production, and refinery runs next year, the outlook calls for a new record for the number of wells to be drilled.

The Journal's forecast, based on reports from operators, will not be available until January of next year, but the factors that normally determine the number of wells to be drilled indicate a gain of 2 to 3 per cent in total completions in 1956.

In past years there has been a very good correlation between the number of wells drilled each year and the total value of crude produced that year, expressed in constant dollars. The chart at the top of page 120 shows this relationship since 1926. Note that the low and high points of each curve tend to follow the same pattern.

The relationship between these two curves can be expressed by the equation:

$$\Delta Y = -594 + 0.01816\ \Delta X$$

Where ΔY is the increase in number of wells drilled in a given year, and ΔX is the gain in value of crude produced that year, expressed in thousands of constant dollars.

This means that there would be no increase in drilling for a gain of only $50,000,000 in total value of produced crude. There would be a drop in completions of about 594 in a year when there was no change in total value of all crude produced.

On the other hand, an increase of $100,000,000 would call for a gain of 588 wells, and a crude-value increase of $200,000,000 should push well completions up by 1,769 wells.

The supply forecast calls for a gain in crude value next year of better than $200,000,000 even without a general crude price increase. However, the 2,000-well increase that would be indicated by the trend has been tempered to cover certain conditions that are not considered in the formula.

One of the important factors is the possibility that there will not be enough steel available next year to drill 2,000 more wells than in 1955.

The forecast now calls for a gain of 2 to 3 per cent. We'll tell you in January what the operators say they have planned for the year.

Offshore Lease Tested

Monterey Oil Co. is testing a 1,280-acre lease under the Pacific Ocean with the 1 State-1549, which is being slanted from an upland site between Newport Beach and Huntington Beach, Calif. The wildcat is drilling below 6,100 ft. Monterey is operator for Humble Oil & Refining Co. and Seaboard Oil Co. in the venture. The group paid $3,333,000 last August for the parcel, which extends 1 mile out in the ocean and is 2 miles long.

FRANK M. PORTER
Fain-Porter Drilling Co.
President

P. C. SPENCER
Sinclair Oil Corp.
Board Chairman

A. W. THOMPSON
A. W. Thompson, Inc.
Vice President, Production

E. B. McCONNELL
Standard Oil Co. (Ohio)
Vice President, Refining

LACEY WALKER
American Petroleum Institute
Secretary

B. BREWSTER JENNINGS
Socony Mobil Oil Co.
Treasurer

CHARLES H. JONES
Richfield Oil Corp.
Vice Pres., Transportation

J. G. JORDAN
Shell Oil Co.
Vice Pres., Marketing

These officers will direct activities as . . .

. . . Annual A.P.I. Meeting Opens Today

SAN FRANCISCO.—This storied city of the gold rush this week will look more like a modern oil town.

More than 6,000 oil men began converging here last week for the thirty-fifth annual session of the American Petroleum Institute.

The A.P.I. is the greatest information clearinghouse in the industry. Its annual gatherings are the largest oil meetings of the year.

Oil talk will fill the air as various group sessions get underway. It will continue unabated through Thursday. Group meetings will be held at four of the city's hotels—the Fairmont, Mark Hopkins, St. Francis, and Sheraton Palace.

The A.P.I. convention headquarters has been set up at the St. Francis with headquarters there also for the press, refining and marketing divisions. The production division has headquarters at the Sheraton Palace along with the Accident-Prevention and Fire-Protection groups. Transportation division and Research Department headquarters are at the Fairmont.

Two general sessions have been scheduled for Wednesday and Thursday mornings, starting at 9:30. Both will be held at the Curran Theater.

Committees of various A.P.I. divisions will meet at odd times during the convention.

A heavy program of work has been set up by the Institute. The calendar reveals these statistics:

. . . 160 separate committee meetings.

. . . 13 group sessions.

. . . 6 board and executive committee meetings.

. . . 2 general sessions.

An imposing array of speakers will appear before the two general sessions and the 13 group meetings. They come from Government, business, and education fields as well as the oil industry.

General session speakers include Secretary of Treasury George M. Humphrey; S. Clark Beise, president of the Bank of America, San Francisco; Gov. Goodwin J. Knight of California; and Walter S. Hallanan, president of Plymouth Oil Co., Pittsburgh.

P. C. Spencer, president of Sinclair Oil Corp. and A.P.I. board chairman, will preside at the big sessions. Frank M. Porter, A.P.I. president, will deliver his presidential address to the Wednesday morning general meeting.

These Men Head the Standing Committees . . .

MONROE J. RATHBONE
Standard Oil Co. (N. J.)

H. S. M. BURNS
Shell Oil Co.

MAURICE N. VINING
Diesel Oil Sales Co.

PAUL W. ZUMBROOK
Sinclair Refining Co.

HENRY SCHWALL
Shell Oil Co.

GEORGE R. BENZ
Phillips Petroleum Co.

W. R. HUBER
Gulf Oil Corp.

WILLIAM R. BOYD, III
Pet. Adm. for Defense

JOHN R. GUYNES
Magnolia Petroleum Co.

RUSSELL H. VENN
Humble Oil & Refining Co.

. . . And Here's the A.P.I. Staff

D. V. STROUP
Director, Technical Services

FRED VAN COVERN
Director of Statistics

H. B. MILLER
Director of Information

J. H. BIVINS
Director, A.P.I.C.

W. H. STRANG
Director of Production

W. T. GUNN
Director of Refining

JAMES E. MOSS
Director of Transportation

A. J. RUMOSHOSKY
Director of Marketing

These men will speak at sessions of the . . .

35th Annual Meeting in San Francisco

SAN FRANCISCO.—Operating problems and future trends in every segment of the oil business will be discussed by speakers before group meetings here of the American Petroleum Institute.

The general group gatherings start today and continue through Wednesday.

The Division of Refining will meet at 2 p.m. today in the Colonial Room of the St. Francis. Following a business meeting, members will hear addresses by Dr. J. E. Wallace Sterling, president of Stanford University, and Lt. Gen. James H. Doolittle, vice president of Shell Oil Co.

The Division of Transportation will meet at the same hour in the Gold Ball Room of the Fairmont. Speakers will be Robert D. Gray, professor of economics and industrial relations at California Institute of Technology; Owen Clarke, member of the Interstate Commerce Commission; and Val Peterson, Federal Civil Defense Administrator.

Production Division members will hold group sessions Tuesday at 2 p.m. and Wednesday at 2:30 p.m. in the Sheraton's Gold Ball Room.

Tuesday's session will feature an appraisal of atomic power by Carl V. Roseberry, manager of commercial atomic power activities for Westinghouse Electric Corp. Reese H. Taylor, president of Union Oil Co. of California, also will talk on "Integrated Oil Men."

Speakers for Wednesday's production group meeting will be O. C. Roehl, vice president of Keystone Custodian Funds, Boston; T. L. Lenzen, Standard Oil Co. of California; and T. V. Moore, Esso Research & Engineering Co.

Other group sessions will be held for medical and health, marketing, public relations, finance and accounting, and petroleum statistics groups.

A. J. BECKER, Becker Marsden Co. — S. CLARKE BEISE, Bank of America — W. H. BRATCHES, Shell Oil Co. — JESSE E. BUCHANAN, The Asphalt Institute — AUSTIN CADLE, Standard Oil Co. (Calif.) — OWEN CLARKE, ICC

J. H. DOOLITTLE, Shell Oil Co. — A. B. GORMAN, Esso Standard Oil Co. — ROBERT D. GRAY, Calif. Inst. of Tech. — N. B. GUYOL, United Nations — W. S. HALLANAN, Plymouth Oil Co. — JAKE L. HAMON, Independent

J. W. HAMMOND, Humble Oil & Ref. Co. — W. E. HOADLEY, JR., Armstrong Cork Co. — E. L. HOFFMAN, Socony Mobil Oil Co. — DR. H. P. HOUSE, UCLA — W. R. HUBER, Gulf Oil Corp. — J. HUGH JACKSON, Stanford University

G. J. KNIGHT
Governor of California

G. H. HUMPHREY
Sec. of the Treasury

A. B. LANGLIE
Gov. of Washington

GORDON C. LOCKE
Com. for Pipeline Co.'s

T. L. TENZEN
Standard Oil Co., Calif.

S. H. McALLISTER
Shell Oil Co.

GLENN A. MARSH
Pure Oil Co.

R. L. MINCKLER
Gen. Petroleum Corp.

T. V. MOORE
Esso Rev. & Eng. Co.

DR. M. N. NEWQUIST
The Texas Co.

JOHN M. PIERCE
Dir. of Finance, Calif.

T. S. PETERSEN
Standard Oil Co., Calif.

VAL PETERSON
Dir. of Civil Defense

FRANK M. PORTER
Amer. Petro. Institute

BRONCE L. RAY
Esso Standard Oil Co.

O. C. ROEHL
Keystone Cus. Funds

C. V. ROSEBERRY
Westinghouse E. Corp.

DR. G. M. SAUNDERS
Socony Mobil Oil Co.

J. W. SINCLAIR
Union Oil Co. of Calif.

DR. STERLING
Stanford University

JOHN R. SUMAN
Consultant

REESE H. TAYLOR
Union Oil Co. of Calif.

LYON F. TERRY
Chase Manhattan Bank

E. J. THOMAS
Goodyear T. & R. Co.

R. E. THOMPSON
Union Oil Co. of Calif.

HOWARD G. VESPER
Standard Oil Co., Calif.

PHILLIP C. WHITE
American Oil Co.

T. T. WILKINSON
Sinclair Refining Co.

JOHN G. WINGER
Chase Manhattan Bank

M. E. WOODWORTH
Nat'l Fire Prev. Ass'n.

M. J. RATHBONE
Standard Oil Co. (N. J.)

M. N. VINING
Diesel Oil Sales Co.

H. S. M. BURNS
Shell Oil Co.

E. B. McCONNELL
Standard Oil Co. (O.)

J. G. JORDAN
Shell Oil Co.

CHARLES S. JONES
Richfield Oil Corp.

MILAN G. ARTHUR
Union Oil Co.

HAROLD DENTON
Sun Oil Co.

P. C. SPENCER
Sinclair Oil Corp.

S. C. OLIPHANT
Tenn. Gas Trans. Co.

EARLE C. HELLUMS
Cron & Gracey Drilling

P. W. ZUMBROOK
Sinclair Refining Co.

These men will preside during . . .

. . . The A.P.I. Program

HENRY SCHWALL
Shell Oil Co.

MONDAY, NOVEMBER 14

Medical and Health, 10 a.m.

"A.P.I. Medical Activities," George M. Sanders, M.D., Socony Mobil Oil Co., Inc., New York; "The Aging, Ailing Truck Driver," M. N. Newquist, M.D., The Texas Co., New York; "Industrial Hygiene in the Petroleum Industry," J. W. Hammond, Humble Oil & Refining Co., Houston; "Some Practical Aspects of the Noise Problem," Howard P. House, M.D., and Adam Glorig, M.D., University of Southern California, Los Angeles.

Fuel-Oil Session, 10:30 a.m.

"Why One-Fuel Chimneys Should Be Abolished in the Public Interest," J. A. Collins, manager of oil heating division, Frontier Oil Refining Co., Buffalo, N. Y.; "Why Electric Heating Will Become a Strong Competitor of Fuel Oil," A. J. Becker, president, Becker Marsden Co., St. Louis; "Opportunities in the Distillate Market," B. L. Ray, vice president, Esso Standard Oil Co., New York.

Public Relations, 11 a.m.

"Oil Industry Information Committee Report," W. R. Huber, Gulf Oil Corp., Pittsburgh; "Tell Your Story—It's **Your** Business!" Arthur B. Langlie, governor of Washington.

Division of Refining, 2 p.m.

Report of division's nominating committee, F. L. Craise, Standard Oil Co. of California, chairman; election of members of the general committee of the Division of Refining; presentation of the A.P.I. "Certificate of Appreciation," Robert E. Wilson, chairman of the board, Standard Oil Co. (Ind.); address, Dr. J. E. Wallace Sterling, president, Stanford University; address, Lt. Gen. James H. Doolittle, vice president, Shell Oil Co., New York.

Division of Marketing Session, 2 p.m.

"Roads to Bigger Markets," J. E. Buchanan, president, the Asphalt Institute, College Park, Md., presentation of the A.P.I. "Certificate of Appreciation," Stanton K. Smith, chairman, A.P.I. marketing committee on awards; "Observations of a Rubber Man," E. J. Thomas, president, Goodyear Tire & Rubber Co., Akron; "Supplier-Dealer Problems and Opportunities," R. L. Minckler, president, General Petroleum Corp., Los Angeles.

Division of Transportation, 2 p.m.

Address, Robert D. Gray, professor of economics and industrial relations, California Institute of Technology, Pasadena, Calif.; presentation of A.P.I. "Certificate of Appreciation," Charles S. Jones; address, Owen Clarke, Interstate Commerce Commission, Washington; report of division's nominating committee, Wendell N. Damonte, Sinclair Refining Co., New York; election of members of the general committee of the division of transportation; address, Val Peterson, director of Civil Defense, Washington; U. S. Chamber of Commerce color film, "People, Products, and Progress—1975."

TUESDAY, NOVEMBER 15

Financial and Accounting, 10 a.m.

"Education for Financial and Accounting Management," J. Hugh Jackson, dean, graduate school of business, Stanford University, Stanford, Calif.; "Petroleum Financing," Lyon F. Terry, vice president, Chase Manhattan Bank, New York.

Division of Production Session, 2 p.m.

"An Appraisal of Atomic Power," Carl V. Roseberry, Westinghouse Electric Corp., Pittsburgh; presentation of A.P.I. "Certificate of Appreciation," L. Laskaris, chairman, advisory committee on fundamental research on occurrence and recovery of petroleum; presentation of the A.P.I. "Certificate of Appreciation," A. W. Thompson, vice president for production.

Presentation to John R. Suman, by H. W. Ladd, Stanolind Oil & Gas Co., Tulsa, on behalf of central committee on standardization of oil-field equipment; response and address, "The Past and Future of A.P.I. Standards on Oil Field Equipment," John R. Suman, consultant, Houston; "Wanted: Integrated Oil Men," Reese H. Taylor, president, Union Oil Co. of California, Los Angeles.

Division of Marketing, 2 p.m.

Open business session; report of division's nominating committee, H. L. Moir, Pure Oil Co., Chicago, chairman; election of members of the general committee of the division of Marketing.

American Petroleum Industries, Committee, 2 p.m.

"Interrelationships Between Government and Industry," John M. Pierce, director of finance, State of California; "Businessmen in Government," T. S. Petersen, president, Standard Oil Co. of California, San Francisco.

WEDNESDAY, NOVEMBER 16

General Session, 9:30 a.m.

Remarks, Frank M. Porter, president; address, Goodwin J. Knight, governor of California; address, Walter S. Hallanan, president, Plymouth Oil Co., Pittsburgh.

Production Session, 2 p.m.

"Management Potential at the Market Place," O. C. Roehl, vice president, Keystone Custodian Funds, Inc., Boston; "Responsibilities of International Oil Companies," T. L.

Lenzen, Standard Oil Co. of California, San Francisco; "Production Technology and Recoverable Oil Reserves," T. V. Moore, Esso Research & Engineering Co., New York; report of division's nominating committee, T. C. Stauffer, Sun Oil Co., Philadelphia, chairman; election of members to the general committee.

Lubrication Session, 2 p.m.

"Carrying the Load," S. H. McAllister, Shell Development Co., Denver, and S. J. Beaubien, Shell Development Co., Emeryville, Calif.; "'Two for the Money'—Gasoline and Motor Oil Are Partners," Howard G. Vesper, vice president, Standard Oil Co. of California, San Francisco.

Committee on Petroleum Statistics, 2 p.m.

"The General Economic Outlook for 1956," Walter E. Hoadley, Jr., treasurer, Armstrong Cork Corp., Lancaster, Pa.; "Probabilities of Petroleum Demand," John G. Winger, Chase National Bank, New York; "Oil in the Total Energy Market," N. B. Guyol, United Nations, New York.

THURSDAY, NOVEMBER 17

General Session, 9:30 a.m.

"Industrial Fission," H. S. M. Burns, president, Shell Oil Co., New York; address, S. Clark Beise, president, Bank of America, San Francisco; address, George M. Humphrey, secretary of the treasury.

Air Drilling to Gain

Wide use of method seen if water problem solved

ABILENE.—A bright future is predicted for air drilling by M. M. Brantly, Midland drilling contractor, if some quick economic means of sealing off formation water can be developed.

Enough air drilling has been done, Brantly claims, to prove substantial benefits in greater penetration, longer bit life, and no lost circulation.

The method currently has its drawbacks, he said, but all can be overcome with added research and trials in the field.

Brantly outlined progress with the method at the annual meeting of the West Central Texas Oil and Gas Association here November 3.

The water problem . . . When air is used as the drilling fluid, bottom-hole cuttings are finely ground—to about the consistency of flour. When water is encountered, it mingles with these cuttings to form a putty-like mass which clings to the sides of the hole and to the drill pipe.

Some recent tests in the Farmington, N. M., area have indicated that troublesome water zones may be overcome by sharply increasing the volume of air circulated.

In one such case an operator was forced to suspend drilling due to balling up of cuttings while circulating air at 2,000 c.f.m. The operator laid a pipeline to the location and circulated gas at 4,000 c.f.m. The higher circulation rate dried up the hole and drilling continued without trouble from the water-bearing zone.

The most desirable means of meeting the water problem, Brantly said, would appear to be drilling through the water zone then squeezing it off with cement or plastic.

Other drawbacks discounted . . . Brantly discounted other objections which often are raised against air drilling, such as the danger of downhole explosions and the difficulty of running samples.

There have been down-hole explosions while drilling with air but none of these occurred, Brantly said, under routine drilling conditions. It's doubtful that the mixture and pressure needed for an explosion would develop under normal conditions, he said.

Geologists after some practice can usually identify with sufficient accuracy the fine cuttings resulting from air drilling. Cuttings reach the surface without having been washed or contaminated.

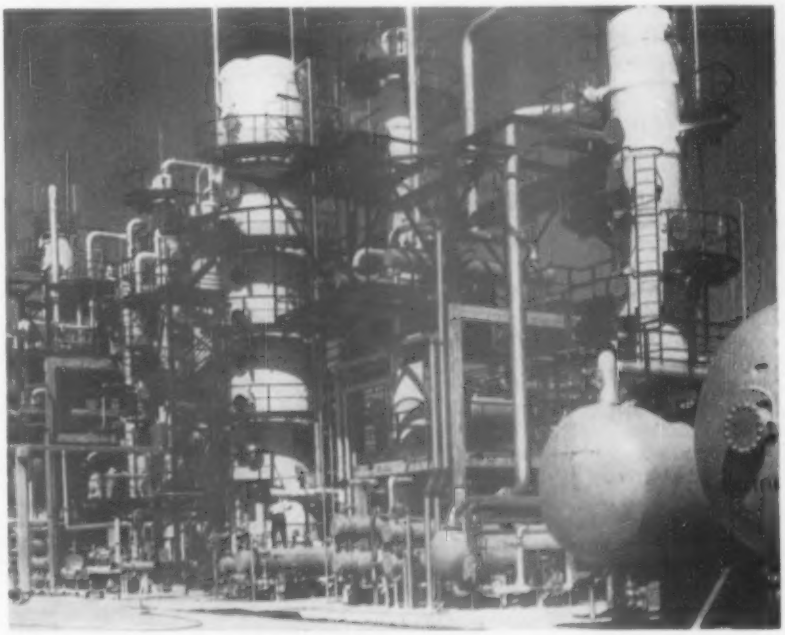
Also, even the lowest-pressure oil or gas zones can be detected since there is no wall cake to seal them off or no pressure against them.

Likewise, air as the drilling fluid does not block or hinder entry of fluid from a low-pressure oil or gas zone. It should prove ideal for completion, recompletion, or clean-out work, Brantly said.

Penetration rates while taking both conventional and diamond cores using air usually run from 25 to 100 per cent higher. Fishing operations present no more problem than in a mud-drilled hole.

Air-job requirements . . . To drill with air successfully, Brantly said, an operator must calculate closely the volume of air needed, taking into account the factors which may vary the requirements.

Most experts agree that the desired annular velocity is about 3,000 ft. per minute.

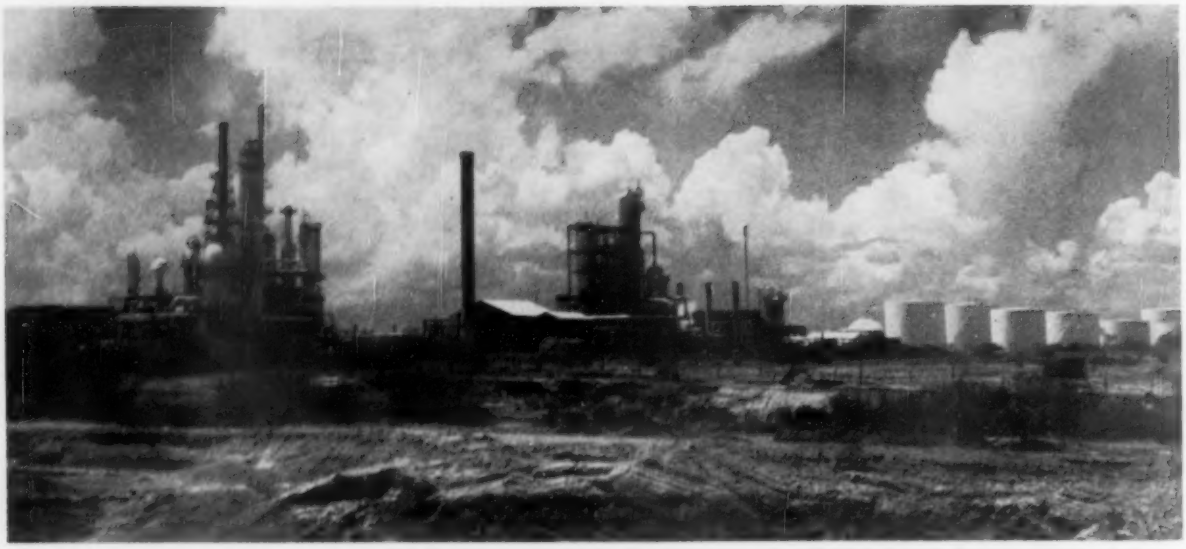


Imperial's New Lube-Oil Plant on Stream

EDMONTON. — Western Canada's first lubricating-oil plant has gone on stream at Imperial Oil, Ltd.'s refinery here. The completely new $13 million installation will produce a line of 41 different types of oil from Leduc crude.

It comprises a phenol solvent extraction unit, a ketone dewaxing plant, and a Hydrofining unit, plus a central control house, storage, blending, and packaging facilities. Hydrogen from a new 2,000-bbl. per day fixed-bed Hydrofining unit employing a platinum catalyst will supply the needs for the Hydrofiner. This hydrogen-treating unit will saturate and hydrogenate certain lube components which contribute to poor color, unpleasant odor, and instability.

This view shows the phenol extraction unit, with the Dowtherm boilers in the background. The plant was built by Canadian Kellogg Co., Ltd.



Suntide Expanding Again

New construction will boost Corpus Christi plant up to 65,000 bbl. daily, tops in the nation for independents

Larry Resen

CORPUS CHRISTI, Tex. — Suntide Refining Co. will have the biggest independent refinery in the country when it expands its Corpus Christi plant from 50,000 to 65,000 bbl. per day.

The refinery here will move ahead of the 64,000-bbl. Tulsa plant of Sunray Mid-Continent Oil Co., which owns 50 per cent of Suntide.

The expansion will boost installed crude capacity to 214,500 bbl. in the Corpus Christi area, the strongest independent refining center in the United States. There are seven refineries here. Six are independently operated. The other is Sinclair Refining Co.'s 28,000-bbl. plant. The independents have a combined crude charge capacity of 186,500 bbl. per day, including the new expansion (see table).

Expansion history . . . Suntide went on stream here early in 1954 with a design capacity of 26,300 bbl. per day. It started immediately on an expansion program that has not let up since.

Capacity was raised only recently from 45,000 to 50,000 bbl. per day. Completion of the new program will lift capacity to 147 per cent of the original design.

Much of the capacity has been achieved by taking advantage of inherent features in the crude unit. The only major addition there has been a preflash tower. Larger crude and product pumps will be installed next.

The fluid catalytic cracking unit, previously modified, is being enlarged to 25,000 bbl. per calendar day. A preheat furnace is being installed to improve operations and gain additional capacity.

Capacity of the hydrofluoric acid alkylation unit has been increased from a design charge rate of 2,000 bbl. per day to 3,000 bbl. per day. And the propylene tetramer unit output also has been raised.

President and general manager of Suntide Refining is Floyd L. Martin, former vice president of Sunray Oil Co., which was merged this year with Mid-Continent Petroleum Corp. *(The Oil and Gas Journal, January 31, page 117).* Other officers include H. G. Gunter, vice president; E. T. Herndon, vice president and treasurer; A. G. Bartlett, general sales manager; and A. T. Smith, general superintendent.

CORPUS CHRISTI REFINERY CAPACITY
(Barrels per day)

Corpus Christi Refining Co.	8,500
Delhi-Taylor Oil & Gas Co.	40,000
Pontiac Refining Corp.	30,000
Southwestern Oil & Refining Co. (2 plants)	43,000
Sinclair Refining Co.	28,000
Suntide Refining Co.	65,000
Total	214,500

*Includes expansion.

Texas Eastern Absorbs Producing Unit

SHREVEPORT.—Stockholders of both firms have approved merger of Texas Eastern Production Co. into its parent, Texas Eastern Transmission Corp.

Plans call for Texas Eastern Production to be absorbed November 20. Its shareholders will trade 2.6 shares for one share in the transmission company.

The production firm was organized in 1950. It was formed separately because gas-regulating policies of the Government at that time made it desirable for a transmission firm to divorce its producing properties. The Federal Power Commission forced an interstate pipeline firm producing some of its own gas to charge it off at actual cost instead of the going field price.

This was changed, however, after the U. S. Supreme Court decision in the Phillips case. The new policy wiped out the advantages of a separate producing company.

Texas Eastern Production had an interest in 58 producing wells—31 gassers and 27 oil wells. Net production averaged 25,455,000 cu. ft. of gas and 1,261 bbl. of oil daily during last August. It had 10,507 net acres of producing leases with undeveloped holdings of 61,000 acres in Texas and 36,000 acres in Oklahoma, Louisiana, Arkansas, and Alabama.

The transmission company delivers and sells gas to wholesale customers in 15 states from Louisiana to New York. Its Gulf Coast-to-New Jersey pipeline system includes about 4,620 miles of line and 39 compressor stations totaling 374,590 hp.

Gulf Buys Out Warren

Warren's worth set above $125,000,000; officials agree to trade four shares of Gulf common for five of Warren

TULSA.—Gulf Oil Corp. has reached agreement with major stockholders of Warren Petroleum Corp. to purchase controlling interest in the company.

A joint announcement by W. K. Whiteford, president of Gulf, and W. K. Warren, chairman of Warren Petroleum, said the deal would be consummated through exchange of stock.

The basis generally will be four shares of Gulf stock for five shares of Warren. An unnamed group of Warren stockholders have agreed to accept a lower percentage of Gulf stock. The exact rate was not disclosed, nor was the identity of the stockholders.

Gulf later will try to buy all remaining Warren stock on the four for five basis. Warren has 1,877,325 shares of common outstanding. It was selling at approximately $65 last week while Gulf was quoted at $85 on the New York Stock Exchange.

"The agreement between the parties is subject to certain conditions which must be met within a limited time in order for the exchange to be consummated," the companies said. "There are a number of details yet to be worked out which probably will delay the transaction until January."

Warren will continue to operate in its present fields as a separate corporation. No change in management or personnel is planned. Assurance also was given that the deal would not affect Warren's previously announced plan to build a 10-story office here.

What's behind the deal . . . Warren is a small company compared to Gulf, the Tulsa firm's assets being $163,920,000 against $2 billion for Gulf.

But the acquisition will greatly strengthen Gulf's manufacturing and distribution of natural gasoline and L.P.G. In Warren, the international giant is gaining a company which has shown exceptional ability in this field, in spite of the unstable conditions which have often prevailed.

Gulf, which never has concentrated on processing its own casinghead gas, has recently been purchasing substantial amounts of natural gasoline for blending. It may be looking ahead to the use of catalytic reforming to upgrade the cheap natural-gasoline into high-octane motor fuels. Gulf now has ethylene production of 1,000,000 lb. daily, and expects to expand further in petrochemicals, with L.P.G. as an important building block.

Warren also has been a pioneer in transporting natural-gas liquids, having built the first ocean-going L.P.G. tanker. The company in the past has sold liquids to Gulf and marketed some of Gulf's own product.

Warren last year produced 1,426,110,000 gal. of L.P.G. and natural gasoline which brought in $79,104,997 of the $109,032,577 total revenue realized by the company. The company's crude-oil reserves have not been made public, but average production last year was 15,637 bbl. daily. Total liquid hydrocarbons ouput was 40,000 bbl. daily.

The companies joined shortly after World War II in buying Devonian Oil Co., now Devonian Co. Warren later bought Gulf's interest and has been paying for it in crude oil at the rate of 1,000 bbl. daily. Payments will continue through next year.

How Warren started . . . It was as an employe of Gulf Oil Corp. that William Kelly Warren became acquainted with the business in which he was later to make a substantial fortune on his own.

From 1916 to 1922 he held various positions with Gulf, Margay Oil Corp., and McMan Oil & Gas Co. before entering business for himself. On March 15, 1922, he organized Warren Petroleum Co. of Delaware. With his wife as bookkeeper, Warren started out as a broker in natural gasoline with a one-room office.

Although he had some shaky years during the depression, he gained the know-how that gave his company a leading position which it still holds in its field.

During 1929-32, Warren formed Warren Petroleum Co. of Oklahoma, Warren Petroleum Co. of Texas, and American Natural Gasoline Corp. All four of his companies were merged in 1937 to form Warren Petroleum Corp. of Delaware, with Warren as president.

Warren engaged in oil and gas production only in a minor way until the $12,000,000 purchase in 1946 of the E. I. Hanlon group of organizations. They included Henaghan & Hanlon, Inc.; Hanlon-Buchanan, Inc.; Smith Brothers Refinery Co., Inc.; Hanlon Pipe Line Co.; Hanlon Gasoline Co.; and Hanlon Gasoline Corp. of Texas.

Warren's crude production was further bolstered by some 5,000 bbl. per day by the purchase of Devonian.

The company markets natural-gas liquids from a dozen of its own plants, 10 others in which it owns varying interests, and some 50 plants belonging to other companies. It engages in export as well as domestic trade.

Warren has six ocean terminals, some 2,000,000 bbl. of storage facilities for natural gasoline and 600,000 bbl. for L.P.G. Warren operates a 33,000-bbl. tanker and a fleet of six barges for a total of 3,800,000 gal. in marine transportation. The company also has a fleet of 4,100 tank cars for products movement.

It owns 124 miles of 6 and 8-in. pipeline to gather and transport some 30,000 bbl. of natural gasoline in Texas, and has 50 per cent interest in the 353-mile, 6-in. Okan pipeline which moves natural gasoline and other products from Hugoton field to the West Tulsa refinery of D-X Sunray Oil Co.

FPC Stands Pat on Gas Case

WASHINGTON.—The Federal Power Commission refused last week to reconsider a ruling that it has control over sales of independent gas producers even before completion of production and gathering.

The FPC denied requests of Deep South Oil Co., Humble Oil & Refining Co., and Shell Oil Co. for rehearing of its September 9 order finding them subject to regulation under the Natural Gas Act *(The Oil and Gas Journal, September 19, page 87)*.

The commission said the companies advanced no arguments not already considered. It affirmed its decision that the three companies are engaged in the sale of natural gas in interstate commerce for resale even though the sales are made before the gas moves through processing plants.

"The evidence of record respecting each applicant's operations clearly shows that applicants' sales of natural gas are sales in interstate commerce for resale under the provisions of the Natural Gas Act," the FPC ruled.

Llano Plans Drilling Tender

ORANGE, Tex.—An offshore drilling tender will be built for Llano Drilling Co. at the Levingston Shipbuilding Co.'s yard here. Cost of the vessel is estimated at $1,500,000.

Llano Drilling Co., with headquarters at Midland, Tex., now operates five rotary rigs in West Texas and New Mexico. The company reportedly will be the first drilling contractor to build a tender of this type of its own use.

The vessel will be equipped with an Oilwell 96 rig having a depth capacity of about 20,000 ft. The tender will be 260 ft. long, 54 ft. wide, and 16 ft. deep. It will contain quarters for 50 men

Many drilling records shattered as . . .

. . . Louisiana Well Hits Record Depth

Ed McGhee

PORT SULPHUR, La. — The oil world has a new drilling-depth record given it by Richardson & Bass. The company's Rig 25 reached 21,502 ft. last Thursday at its wildcat in the Mississippi delta marshes 35 miles southeast of New Orleans.

The Fort Worth operator exceeded the former world record of 21,482 ft. early Wednesday and kept on drilling ahead in shale with streaks of sand. Drilling temporarily halted last Thursday, however, while the crew changed a bit. The old record depth of 21,482 ft. was held by Ohio Oil Co. for a well in Kern County, California *(The Oil and Gas Journal, November 7, page 65).*

Richardson & Bass hopes to carry the 1 LL&E-Humble "L" at least to 22,500 ft., barring any unforseen trouble. Absolute depth capacity of the rig and drill pipe exceeds 25,000 ft. The rig has been averaging from 20 to 40 ft. per day for the past week, mostly in shales. Since drilling out from under the last casing string at 19,752 ft., the hole has stayed in good condition.

There also is a good chance the well may become the world's deepest producer. Cores have been recovered from below 20,000 ft. with encouraging oil shows. Deepest production ever recorded was from 17,500 to 17,895 ft. in a California well no longer producing.

Associated in the record venture with Richardson & Bass are John Mecom, Houston independent, and Freeport Sulphur Co. of Houston. Humble Oil & Refining Co. participated in the well to a depth of 16,000 ft. It has no financial interest below that depth. Location is on fee land of the Louisiana Land & Exploration Co. of New Orleans. The well site was dredged from the South Louisiana marsh a few miles from here.

Cost of the venture through last Tuesday has totaled $1,500,000. The location was selected and the project undertaken because of the strategic importance of a deep well at that point. The well is 6 miles east of Freeport's huge Grande Ecaille sulfur mine and 3 miles east of nearest oil production at Lake Washington, one of Louisiana's largest fields.

The well is situated on a 10,000-acre lease held by the drilling group. It will evaluate the deep oil possibilities of the area.

Many firsts . . . Richardson & Bass' well brings the depth record back to the Gulf Coast for the first time since 1946. Then, the record fell that had been held for a year by a Texas coast well of Phillips Petroleum Co. According to modern records, this also is the first time Louisiana has held the drilling depth record. However, the deepest wells currently producing are at Weeks Island, not far from the new record breaker.

Richardson & Bass' barge Keystone, which carries Rig 25, is believed to be the first drilling barge ever to hold the record.

Record mud, too . . . The 1 LL&E-Humble "L" is the deepest that a lime-treated drilling mud has ever been carried. Static bottom-hole temperature in the well at present is estimated to be around 350° F. Lime-treated muds usually cause trouble by solidifying at this temperature. As yet, though, the mud has been kept in good condition and has caused no undue delay in drilling.

The mud weighs about 18 lb. per gal. and contains a little less than 3 lb. per bbl. of lime. However, mud viscosity going into the pumps is only 55 to 65 sec. and fluid loss is from 1 to 2 cc. A.P.I. The mud contains 8 per cent diesel oil, and P_f alkalinity ranges around 3 cc.

It now takes more than 2,750 psi. to circulate the mud. Moreover, it takes 7 hours to get returns off bottom and 9½ hours to get a complete circulation of mud.

Cased deep . . . There is less than 2,000 ft. of open hole in the record well. Having casing so deep gives Richardson & Bass an excellent chance of reaching its objective depth. Last pipe set is a 7-in. liner that extends to 19,752 ft.

Other casing strings include a 20-in. water string set 302 ft. and surface pipe at 3,003 ft. Next string is a 9⅝-in. string at 13,486 ft.

Since drilling out from the 7-in., the hole size has been 6-in. And except for 3 diamond core bits, all bits have been hard-formation rock bits.

If an oil string is set in this record well, Richardson & Bass's engineers plan to use a 5-in. integral-joint pipe

SEPARATE BOILER BARGE furnishes all the power for world's deepest drilling job.

to be hung all the way from the surface to cementing depth—certainly a record-breaking string in many ways.

Mammoth equipment . . . Rig 25 carries some of the biggest steam equipment ever built. It's two main pumps are 22-in. Ideals, and only one of these monsters at a time need be used on the hole. The mud mixer is an Oilwell 320. It's big enough that it was used on the hole down to more than 11,000 ft.

The 2,750-hp. 16 by 16 duplex Ajax steam engine that powers the drawworks is believed to be one of only three ever built this big. In spite of the power available on the drawworks, the rotary is driven independently by a No. 9 Oilwell vertical engine.

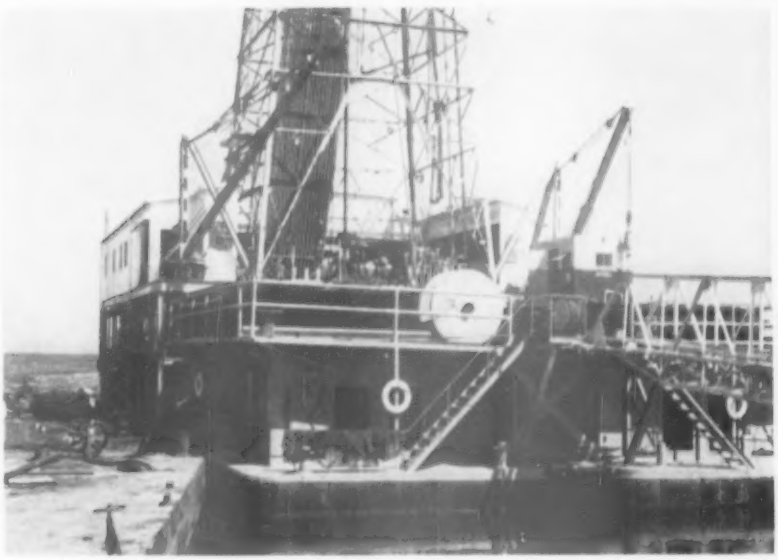
Five 150-hp. Lucey boilers are required to supply steam for all this equipment, seven boiler-feed and oil pumps, and to furnish electric power. These are on a separate boiler barge.

The drilling string is a combination of 4-in. and 2⅞-in. drill pipe. Some 13,000 ft. of it is 4-in., and the remainder is 2⅞-in. That's more than 228 stands of pipe now being handled. A round trip to change the bit on this much pipe consumes more than 9 hours.

Thus far, the only fishing job came up after testing perforations inside the 7-in. liner. The string was stuck while drilling out a cement retainer. Although recovering the fish took a lot of time, there was no special difficulty in doing it.

About the only other serious trouble came while squeeze cementing perforations in the 7-in. The high bottom-hole temperature caused a premature set of the slurry. The result was a cemented up string of drill pipe.

M. C. Fontenot is manager of the Richardson & Bass Louisiana account. W. H. Spurlin is drilling superintendent, and M. C. McCall is assistant drilling superintendent.



MAMMOTH EQUIPMENT plays a key role in the new drilling record.

Old record . . . The well displaced as deepest ever drilled is Ohio Oil Co.'s 72-4 Kern County Land Co.-A in the Paloma field of Kern County, California. It reached a depth of 21,482 ft. in November 1953, and was stopped there by a fishing job. After lengthy fishing and completion attempts, this well was finally abandoned last January.

It took the California well more than 2 years to reach its deepest point, but Richardson & Bass took only about 255 days. This includes some 2 months consumed in testing sands behind the 7-in. liner.

Richardson & Bass broke the depth record for the Gulf Coast back in September. The 1 I.L&E-Humble-"L" then had passed the previous mark of 20,450 ft. set in the George Vasen 1 Fee in Stone County, Mississippi. That mark was also set in 1953.

Previously, the deepest hole in Louisiana had been drilled by Magnolia Petroleum Co. This well in Allen Parish was drilled to 18,660 ft. in 1952.

The short-lived well that set the deepest-producer record is Richfield Oil Corp.'s 67-29 C.L.A. which made gas and condensate. This is in California's North Coles Levee field near Bakersfield, and the producing zone was from 17,500 to 17,895 ft. Deepest well currently producing is Humble's 2 Rita Provost-Minvielle which makes gas-condensate from 17,530-54 in the Weeks Island field.

Oil men eye depths off California . . .

. . . Platform Designed for 300-ft. Water

D. H. Stormont

LOS ANGELES.—A mobile platform for exploratory and development drilling in 300-ft. waters off California has been designed by three West Coast companies.

Labeled the Peristyle platform, the structure was designed especially to operate on the rapidly sloping, irregular shelf jutting out from the West Coast. It is supposed to be able to withstand wind, waves, ocean currents, and even earthquakes without damage at the critical point where the well casing enters the earth.

A huge hull will float the platform to the offshore site. When it is filled with water and submerged, a cutting edge containing numerous jets will bite into the ocean floor and anchor the hull firmly.

For water 310 ft. deep, the hull will be 180 ft. in diameter by 50 ft. high. Seven tubes, 9 ft. in diameter and 370 ft. high, extend upward from the caisson to the base of a three-deck circular drilling platform 110 ft. in diameter (see sketches).

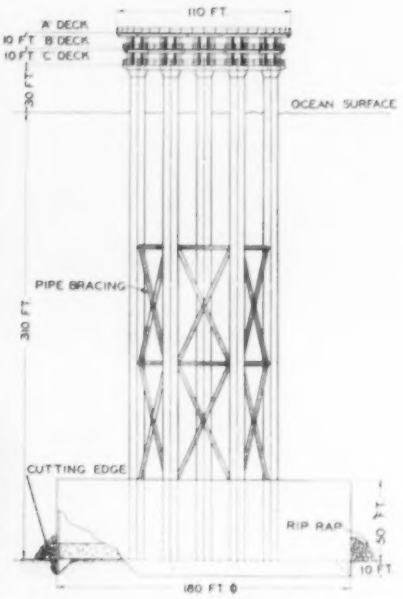
The operator can drill through any or all of the supporting tubes. In development drilling, 21 wells with 7-ft. spacing could be completed through the supports. The designers estimate some 15 sq. miles could be explored by directional drilling from a single site.

The platform was designed by Terminal Drilling & Production Co., Los Angeles; Pacific Bridge, San Francisco; and International Engineering Co., Los Angeles. It was described in a paper by J. N. Gregory of Terminal at the fall meeting of the Southern California petroleum section, A.I.M.E.

Topography problems . . . He pointed out ocean-floor topography will offer a real challenge to operators using drilling platforms off California.

The water gets deep rapidly, unlike the Gulf Coast where the slope is fairly gentle. The shelf off the West Coast is cut by deep canyons. Topography varies greatly. Some parts are sandy, some clayey, and same are scoured to a firm, competent shale.

Where the ocean bottom is too uneven, or cannot be penetrated by the hull's cutting edges, a good site may have to be prepared. If a favorable site is not available directly over the desired bottom-hole location, slant drilling could be carried out from a better site.



Once the platform is in place, the cutting edges will secure it from horizontal movement.

With the hull submerged, the supporting tubes extend upward to a height dictated by the water's depth. The drilling platform must be raised or lowered for a desired clearance above water. Gregory says that portions of the tubes extending above the top deck would be cut off.

Equipment location . . . The top deck will carry the derrick, draw works, rotary, hoisting equipment, and such auxiliary units as a hoisting crane. In development work, the rig can be skidded from location to location above the tube supports.

The second deck houses the mud circulating system and tankage for mud, cuttings, water, and fuel oil. Equipment on this deck will be permanently fixed.

The third deck accommodates production equipment, additional tankage, and storage for mud and cement. The tube being used for drilling will be cut off at the lower deck, allowing room for installing and manipulating blowout preventers and wellhead controls.

No living quarters are provided. Since most drilling is expected to be done fairly close to port facilities, quarters should not be necessary.

The dimensions described by Gregory provided for minimum areas for economy reasons. More space could be obtained by expanding the decks. Decks could be added, the designers believe, without upsetting platform stability.

The platform was designed as a complete, self-contained unit. Floating auxiliary equipment was considered undesirable. Heavy swells would make such vessels hard to handle and they would exert a side pull on the platform. The design engineers prefer to have all weight resting upon the Peristyle.

Products Line Finish Near

LOS ANGELES.—Southern Pacific Pipe Lines, Inc.'s 842-mile Los Angeles to El Paso products line is nearing completion with more than 700-miles of pipe now underground. During October the contractors laid 177 miles of pipe.

The lowering-in and tie-in work was 80 per cent complete last week. Eighty-five per cent of the weld and lineup work was done. Testing has been conducted on the El Paso to Lordsburg, N. M., spread. The only pipe laying now in progress is between Phoenix and Yuma and between LaHabra and Beaumont in California.

The company expects all pipe to be in the ground by January. Then only finishing up work on pumping stations and terminals will remain before the line is put into operation early next year.

$1.2-billion budget slated as . . .

. . . Jersey Tells '56 Plans

NEW YORK. — Standard Oil Co. (N. J.) has budgeted a record $1,200,000,000 for capital investment and expenditures in 1956.

About $1,100,000,000 of the total will be spent by Jersey Standard's operating affiliates. The remaining $100,000,000 will be Jersey's share in the planned spending of companies in which it has a half interest or less.

Eugene Holman, Jersey board chairman, disclosed the record spending plans. He pointed out it will be the largest sum ever spent in a single year in the history of the Jersey Standard group.

It also appeared to be the largest single budget in the history of industry in general. It is greater, for example, than the huge 1954 budget of American Telephone & Telegraph Co. which called for an outlay of $1,130,000,000. It is believed to have held the record.

Holman said the 1956 budget represents an increase of about 20 per cent over the group's 1955 spending.

He said that 85 per cent of the total budget will be spent in the Western Hemisphere. Almost half—43 per cent—will be spent in the United States alone. Major Western Hemisphere spending outside the U. S. will be in Canada and Venezuela, he said.

Half of the total budget, Holman said, will be spent by Jersey's consolidated affiliates to find and produce oil. A fourth will go into refining operations, and the remaining fourth will be earmarked for marketing and transportation.

Reasons why . . . In a statement which fairly exuded optimism, Holman said Jersey Standard believes the whopping investment is necessary to meet anticipated demand for oil. He pointed out also that the decision to spend so much money reflects the confidence of the industry's biggest company in the economic outlook and increased use of energy from oil.

"Since the end of World War II, free-world demand for petroleum products has approximately doubled," Holman said. He estimated that free-world demand in 1956 will be 5 per cent higher than in 1955. He said many countries of Europe and Latin America are showing "particularly sharp" gains each year.

"We expect free-world demand, exclusive of the United States, to rise some 7 per cent next year," Holman explained. "In the United States petroleum requirements will increase about 4 per cent."

"We must, therefore, continue to press exploration for new oil reserves, drill more wells, and extend development of improved methods of recovery."

The Jersey chairman said new refineries must be built, existing refineries must be enlarged and altered to use the techniques coming from research laboratories, and new pipelines and tankers constructed.

He called the increase in energy demands "a tremendous challenge" to producers of all kinds of fuel.

Total is great . . . By the end of this year, the total spent by Jersey Standard companies for capital expenditures and exploration since the end of World War II will be more than $6,000,000,000.

The companies in which Jersey has a 50 per cent or less interest have spent another $2,500,000,000 for the same purposes in the same period. Holman estimated that Jersey's share of the latter figure has been about $750,000,000.

Jet Fuel to Go Underground

WASHINGTON. — A major test of underground jet fuel storage will begin next year near Wichita or McPherson, Kans.

Bids for a 300,000-bbl. storage and handling contract will be opened December 12 by the Armed Service Petroleum Purchasing Agency. The contract will run for 1 year, with a government option to renew annually for the next 4 years.

ASPPA is asking for three salt caverns of about 100,000 bbl. each. Converted salt mines will be "acceptable" if properly bulkheaded, isolated, and sealed. Smaller caverns may be grouped to provide the 100,000-bbl. capacity.

South Texas Production Sold

DALLAS. — Producing Properties, Inc., of Dallas, last week paid $3,875,000 for established oil and gas production in Marrs McLean and Phelan fields of Jefferson County, Texas.

The purchase was made from Clegg & Hunt et al, Houston. It included three gas wells in Marrs McLean and one gasser and three oil wells in Phelan field. Producing area is about 1,500 acres.

Industry Briefs

FORT WASHAKIE, Wyo. — Frank W. Winegar of Denver last week made the highest bid ever recorded for oil and gas leases on the Wind River Indian Reservation in Wyoming. Winegar offered $268.81 per acre for 1,280 acres, a total of $344,077. Leases on a total of 9,496 acres were sold, bringing a record $900,024.

SAN FRANCISCO. — Tide Water Associated Oil Co. took over operations of Pacific Western Oil Corp.'s producing properties in California November 1. Involved in the recently concluded agreement were 450 wells producing 7,500 bbl. daily. Pacific Western's largest development is in the Belgian Anticline field where they have 45 wells producing more than 2,700 bbl. daily.

Pacific Western, holder of half interest of a concession in the Neutral Zone, is turning over its domestic operations to its domestic affiliates.

HOUSTON.—Negotiations are under way for the purchase by Schlumberger Well Surveying Corp. of Johnston Testers, Inc. The proposal, involving slightly more than $8,000,000, will be submitted to Johnston stockholders for their approval at a special meeting to be held after December 10.

NEW ORLEANS.—Southeastern Drilling Co., Dallas, has awarded contract to Avondale Marine Ways, Inc., New Orleans, for construction of a portable, submersible drilling unit for operations in the Gulf of Mexico. The vessel was designed by Friede & Goldman, Inc., New Orleans.

WASHINGTON.—A prototype tanker of a new "Pipeline" class will be built by the Maritime Administration next year. Bids on the T5-S-RM2a tanker are to be opened February 1. It will be 615 ft. in over-all length with a breadth of 60 ft. It will have a 21-knot speed and 180,000-bbl. capacity with full load displacement of 31,345 tons.

CHEYENNE, Wyo.—The Wyoming Public Service Commission has authorized Continental Pipeline Co., Ponca City, Okla., to purchase a gathering system in Wyoming's Frannie oil field from Interstate Oil Pipeline Co., Shreveport, La., for $55,000.

The commission also granted Utah Oil Refining Co. permission to operate a 4-in. pipeline from the La Barge oil field in Lincon and Sublette counties to railroad right-of-way near Opal, Wyo.

CAPSULE of cobalt 60 is moved into place with a 6-ft. magnetic pole held by George Fisher, inspector for Brewster Co., oil equipment manufacturer of Shreveport. Cobalt radiation penetrates the thick cast-steel walls of the triplex hooks, exposing radiographic film taped on other side. This reveals any internal defects in casting.

ANODE VOLTAGE of a Geiger counter on a Liby radio-carbon machine is being adjusted by Robert E. Fearon, president of Electrochemical Laboratories Corp., Tulsa, radioactive engineering consultants.

Oil men adopting atomic tattletales . . .

. . . Isotopes Find Many Uses in Field

W. A. Bachman

TULSA. — Isotopes are tattletales. That's the secret of their increasing use in the oil field. And it's just beginning.

Some old timers in the atom business say the oil industry is on the threshhold of a new era. The impact of nuclear radiation—especially its ability to be traced and measured—is being felt in the exploration, drilling, and production ends of the business.

They think new applications will force the earth to give up more of its mineral secrets. Tough drilling problems will be solved. And the day is nearer when the oil man will approach 100 per cent recovery of his known reserves.

Others are more cautious. But they, too, admit the industry is only beginning to use this new tool. Its application in the field offers tremendous possibilities.

Where Do We Stand?

Radiation made its appearance in the oil field as early as 1940. But it was expensive and its application was limited. Postwar developments have brought costs within reach of everyone and extended uses of radiation.

This economic factor is still becoming more favorable. For example, one curie of radium—usually the prewar source of radiation—still costs $20,000. Cost of a cobalt isotope now will average from 60 to 75 cents a curie. Tritium recently dropped from $100 to $2 a curie. Costs of other radioactive sources have enjoyed a similar drop.

This easy accessibility to sources of radioactive materials has mushroomed their use in the oil field. A broad view finds isotopes busy in the following fields:

. . . **Exploration.** Radioactive isotopes sent outside the casing in conventional logging operations now tell the geologist what's underground; indicate porous formations likely to yield fluids; determine the age of deposits laid down. They even are being used to tell the mineral content of subsurface formations.

. . . **Drilling.** Tracers in mud detect casing leaks and areas of lost circulation. They tell the operator exactly where his material goes in a cement job or mark the top of the cementing. They will position the acid for a shooting job or locate zones opened by fracture treatments.

. . . **Production.** Other tracers show the oil man where his porous and permeable formations lie. They trace the flow of oil or water, allowing the operator more accurately to trace his water flood or gas-injection activities in secondary recovery. They can permanently map a reservoir for secondary and tertiary recovery.

. . . **Pipelining.** Radioactive interface separate different tenders in a products pipeline. Tracer materials sent along with a pig in clean-out work chart the scraper's position.

. . . **Specialties.** Other radioactive techniques detect areas of corrosion in lines and vessels. They show up flaws in metal castings and sheets, measure liquid levels, and help calibrate instruments.

Logging Points Way

The oil well logging companies pioneered use of radioactivity in the oil field.

As early as 1940 they were helping spot different formations in a well by measuring the gamma rays thrown off by all rocks of the earth. The comparative radioactivity had been charted for various rocks. By comparing the readings of their detectors with these known values, the technicians could indicate various formations.

But neutron logging quickly supplemented this; and the use of isotopes

started. A generator of neutrons was lowered into the hole—at first radon, and later isotopes of polonium and beryllium. The neutrons bombarded and penetrated rocks surrounding the bore. The atoms of the elements composing the rocks captured the neutrons. The process created unstable isotopes which emitted gamma rays. These again were recorded by instruments in the bore hole. The affinity of neutrons for the hydrogen nucleus made this development noteworthy.

The gamma-ray curve had primarily identified the extent of sand or shale formations. But now the neutron curve went further. It indicated fluid-bearing zones since it reflected the presence of hydrogen. The fluid may be oil, gas, distillate, or water. The new tool did show the porous zones of a well, whereas gamma-ray detection showed only the permeable zones.

These combined techniques proved valuable in proper completion methods since the dense, fluid-bearing zones could be pinpointed. It resulted in many recompletions to prolong productive life of wells. The technique also was used to detect gas-fluid contacts, to locate casing shoes, parted casing, liners.

Basic mineral exploration has received another boost by recent developments — introduction of the "atom smasher" to the oil field. This makes it possible more accurately to determine the mineral content of formations.

The neutron generator is a small version of the big particle generator and accelerator. It produces ultra-high-speed neutrons of far greater penetrating power than provided by previous sources. The radiation produced is recorded on a scintillation spectrometer which can determine the nature and extent of various elements in the formation.

This technique has other advantages:

. . . **The accelerator can be clicked** off and on at will to control the neutron flow.

. . . **There are no radioactive** materials left in the area to complicate future work-over activities.

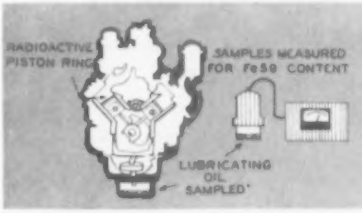
These tools progressively are giving the oil man a better picture of what's below the surface—an invaluable lift in his search for crude.

As a result, the well service and logging companies are steady customers for isotopes from Oak Ridge, Tenn., and Brookhaven, N. Y., plants of the Atomic Energy Commission. They not only are using some isotopes commercially but their research crews also are experimenting with others. The isotopes being used include cobalt 60, boron 10, iron 59, antimony 124, chlorine 36, polonium 210, tritium, tellurium 99, europium 152.

How Isotopes Are Used Today

Radioactive Iron

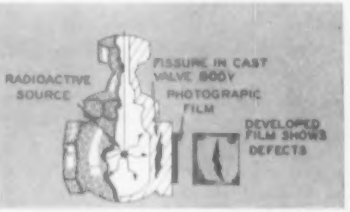
For Friction and Lubrication Studies



ADVANTAGES: Transfer of metal measure to 1/100,000 ounce; oil sampled during operation of motor; rapid, simple, economical.

Radioactive Cobalt

For Radiography Testing



ADVANTAGES: Versatile and reliable inspection; inspection made without dismantling; sources of desired shape and size.

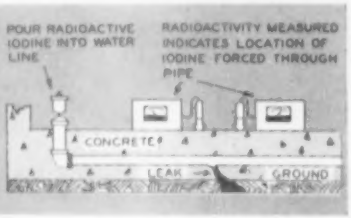
Radioactive Cobalt

For Indicating Liquid Height

ADVANTAGES: Gage not affected by corrosion and temperature; can be operated by nontechnical personnel; adaptable to automatic recording and control of liquid level.

Radioactive Iodine

For Detecting Leaks in Water Lines



ADVANTAGES: Not necessary to remove floors; less costly and more convenient; short half-life and no residual activity.

"Isotopes . . . An Eight-Year Summary of U. S. Distribution and Utilization." U. S. Atomic Energy Commission, 1955.

The Driller and the Atom

The tattletale ability of radioactive isotopes has spread their use far from the logging field. They now solve many other problems vexing the driller.

One of these first prewar uses was to tell the driller where his material went in a cementing job. Carnotite, a conglomerate of the uranium series and known in the trade as casing compound 60, first was used. It was mixed with cement and could be easily traced outside of the casing by its gamma-ray emissions.

More recently elements with shorter lives have been used in this work to avoid later complications in the well. Such isotopes are radon, antimony 124, barium 140, bromine 82, iodine 131, potassium 42, zinc 65, iridium 192.

Great detective . . . Drillers then gave other jobs to the radioactive isotopes. They were used to tag the top of a cementing job for future reference. They were mixed with the mud stream to locate zones of lost circulation or channeling or spot casing leaks. They were mixed with acid and pinpointed for shooting a particular zone. They became a vital part of squeeze cementing jobs.

Fracturing technicians also took up the new tool. Radioactive materials were mixed with snythetic resins as carriers and put in the fracturing fluid. They located zones opened by the fracturing treatments. Other operators rendered some of the sand grains in the fracturing radioactive. These tracers also showed where the fractures were and how intense. The oil or water breakdown fluid also was made radioactive. The log then would tell if the fracturing material was hitting the desired zone.

One major well-service company is still conducting research using radioactive solids to determine if a vertical or horizontal fracture has been achieved. The same company is using isotopes of different half-lives mixed with oil in the fracturing fluid. It is studying the returned oil to determine how it mixed with the formation.

Some oil companies have taken out radioisotopes to study new tracers for drilling muds and cement and develop new tracers to measure penetrating

depth of drilling fluids in cores. Some are doing research in oil well formations and studying the acid adsorption in strata formation.

Radioactive Mapping

One of the fastest-developing areas for radiation is underground tracing of oil and gas movements.

A wide concentration of research talent is being applied to this field. Techniques are being developed to map underground reservoirs, to determine porosity of formations, and to trace water flood, gas, and oil injection projects.

Mass movements of all types of fluids in all types of reservoirs can be traced. This is enabling the oil man to end some of the mysteries of his reservoirs and reveal the hidden links between leases where no well logs and no cores ever were taken.

Methods and radioactive isotopes used are similar in most cases. Tritium, tritiated methane, krypton 85, and iodine 131 are most often used. The radioactive gas or fluid is injected in one well of the field and appears at other producing wells. The elapsed time the material takes to appear at the producing well and the amount of the isotope recovered are calculated. The results show the direction of flow, indicate underground influence on flow, and reveal extent of the reservoir *(The Oil and Gas Journal, August 29, page 77)*.

Radioactive tracers have proved their value in showing which formations are being affected in water flooding. Tracers are injected into the flood. They are fixed on carrier particles too large to pass readily through the formation and build up at the entrance. Then they are detected with logging instruments.

This is similar to the method used in injecting radioactive oil to find fracture zones. The same procedure is followed to get gas-injection profiles in repressuring projects.

Research activities in at least a score of oil-company laboratories are directed at finding out more about the dynamics of oil-gas flow, porosity of formations, flood-saturation distribution, effects of neutron bombardment of sand or rock, and literally hundreds of other allied radiation projects.

Where Will It Stop?

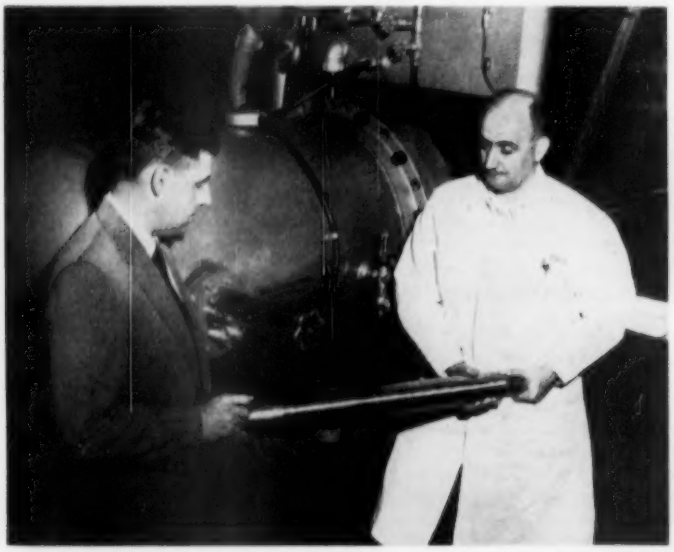
Every segment of the oil industry has put radioactive isotopes to work.

Only a limited application has been made in pipelining so far, but this may be extended by studies under way in at least 10 laboratories.

Actual use of radioactivity in pipelining has been limited to tracers. They mark the interfaces in product lines, locate scrapers, gage density and fluid levels, and detect corrosion and pipe failures.

Much research also is under way on corrosion, using radioactive materials to determine adsorption of inhibitors, test ability of various metals to withstand corrosion, study effects of flow rates, etc.

Everywhere engineers, nuclear physicists, and chemists are applying this new-found atomic knowledge to the oil industry. Its future appears limitless.



TINY NEUTRON generator held by Dr. Richard Connor, left, of High Voltage Engineering Corp. and Thomas Hubbard of Well Surveys, Inc., is miniature of regular size, 500,000-volt Van de Graaff generator in background.

ATOM SMASHER and its companion detector are being sent into Well Survey's experimental well in Tulsa by Eric Hopkinson, left, and Arthur Youman.

World's Smallest 'Atom Smasher' Tested

TULSA.—A new high-powered neutron generator, called the world's smallest "atom smasher," is getting its experimental tests here. It fits in a standard 3⅜-in. well-logging probe and is designed to give more positive facts about oil-bearing formations.

The experiments are being run in the test well of Well Surveys, Inc. The firm is an affiliate of Lane-Wells Co., one of the Dresser Industries.

The tiny neutron generator is a miniature of a Van de Graaff particle accelerator. It generates electrical potentials up to 200,000 volts. These are used to produce a stream of atomic particles, "deuterons," which are nuclei of heavy hydrogen atoms. These particles are fired into a target of tritium, super heavy hydrogen. The collisions of deuterons with tritium atoms produce an intense yield of neutrons.

The neutrons then are shot from the probe at extremely high speeds. They penetrate formations surrounding the bore hole and set off nuclear reactions with atoms of elements in the rocks. These reactions, in turn, yield atomic particles and rays which are identified and measured by detection equipment placed in the probe with the accelerator.

The resulting information is transmitted to the surface and recorded.

These data are correlated with results of neutron radiation research performed with the large half-million-volt accelerator in Well Surveys' laboratories to identify and evaluate formation constituents.

Dr. John H. Buck, vice president and technical director of Well Surveys, reported "the smallest Van de Graaff before our work was a 500,000-volt unit 4 ft. in diameter and 6 ft. long."

He explained "we wanted high flux of fast neutrons from a unit small enough to penetrate any drill hole. Beyond that, the device had to draw very little electric power, withstand temperatures up to 300° F. and external pressures up to 20,000 psi. That was quite an order.

"After exhaustive study of the problems involved and extensive discussion with High Voltage Engineering Corp., Cambridge, Mass., we decided to utilize their unique technical experience in a joint effort."

High Voltage Engineering's Van de Graaff accelerators already are familiar sights in the petroleum industry. They are being used widely both for fundamental and for chemical processing research. Such leaders as Shell, Gulf, Socony, Magnolia, and Humble have purchased multimillion volt machines for these applications.

Core Holes Planned Offshore

LOS ANGELES. — Richfield Oil Corp. will start stratigraphic drilling at its 1,175-acre offshore lease in the Rincon area of Ventura County some time this month.

A small core boat will be used for the tests, some of which may be as deep as 2,000 ft.

The company plans to start construction on the first of two earth-filled islands next May. When completed, the islands will be 320 ft. wide and 440 ft. long. One will be 6,250 ft. from the coast and the other 2,700 ft. *(The Oil and Gas Journal, October 17, page 101.)*

Looping Almost Completed

LOS ANGELES.—Looping of Southern Counties Gas Co.'s entire 210-mile Colorado River to Los Angeles pipeline will be completed next week. Completion of the final 31.5-mile segment between Cactus City and Desert Center in Riverside County will wind up work on this $2,500,000 project.

The line, jointly owned by Southern Counties and Southern California Gas Co., joins El Paso Natural Gas Co.'s 30-in. line near Blythe, Calif. Capacity of the pipeline is 713 million cubic feet.

WATCHING WASHINGTON

Bertram F. Linz

FPC Irks Industry

There's growing resentment in gas circles over the failure of the Federal Power Commission to lay down ground rules for regulation of independent producers.

The FPC so far has refused to state clearly what evidence should be given to justify price increases. But all indications are that it is leaning toward the public utility type of regulation for producers.

The commission has said repeatedly it doesn't believe producers' field prices can be set on the basis of cost. But staff briefs and rulings all seem to run that way.

This was pointed up last month when the FPC refused to dismiss three rate-increase cases *(The Oil and Gas Journal, October 31, page 63)*. It said the producers hadn't made a case. It gave them additional time in which to make a showing. But it didn't say what the showing should be. And it reserved the right to reject any evidence without explanation.

Lawyers practicing before the FPC contend that commodity value should be used in fixing rates.

Canadians Feel Slighted

Oil interests with investments in Canada should keep an eye on the dominion government.

There's a growing feeling north of the border that U. S. investors are beginning to control the economic future of Canada. High officials already have said they will not permit that to happen.

It isn't denied that Canada wouldn't be in its present sound position had it not been for U. S. capital and technical skills. But Canadians are upset because they have little or no part in the management of U. S.-financed companies.

A recent survey showed that of more than 4,000 firms which are branches or subsidiaries of foreign concerns, only 2 per cent have Canadians on their boards of directors. In many of these companies Canadians own 50 per cent or more of the stock. Many of them issue no reports showing their Canadian operations separately.

"American economic imperialism" hasn't entered into the picture—yet. And Canadian officials don't want laws controlling foreign corporations. But, as one put it, they do feel that Canadian subsidiaries or companies owned or controlled abroad should be treated as Canadian companies. They should make the same type of financial reports, and make stock in the Canadian concerns available to dominion investors. And they should make room in top management for Canadians.

The Canadian people not only desire to be, but are becoming determined to be active partners in Canadian enterprises, he warned.

More Automation Studies

Automation will be the subject of much discussion in Congress next year. But there won't be any legislation. So far, nobody knows what to do about it, if anything.

A Senate-House inquiry has brought out the views of labor and management. The study probably will be continued through the coming session. But before any bills are written, Congress is expected to ask the Labor Department to make more complete studies of productivity as affected by automation. The Commerce Department will probably study types of products which may be objects of automation.

Labor will call for increased federal aid to education to prepare young people for the more technical jobs of the automatic age. It will ask for a shorter work week, possibly 30 or 35 hours. It will demand more federal public works to make jobs for the 11,000,000 new workers expected in the next decade. It sees a need for federal standards for unemployment compensation, an earlier retirement age and federal aid to small business.

Management sees no need now for a panacea for an ill that hasn't developed. It believes that automation, like other technological advances over the past 150 years, will make more jobs than it wipes out. It sees it as the only way to meet the needs of a fast-growing population at bearable cost. Management points out that automation in the automobile and oil industries, among others, has not cut down the number of workers. Much of what is lost in production jobs is offset by increases in maintaining forces. And expanding demand takes care of the rest.

To lengthen well life . . .

. . . Novel Completion Used

Robert J. Enright

OAKVILLE, Tex.—Highly corrosive gas production has forced operators in Oakville field in South Texas' Live Oak County to resort to unusual dual completions.

Both the Luling and Slick gas zones of the Wilcox are produced through one 2-in. string of tubing to protect production casing against corrosion and thus lengthen life of the wells.

The Slick zone produces at a rate twice its allowable for the first 15 days of the month. The Slick is then shut off and the Luling produces twice its daily allowable for the last half of the month.

So far, four wells in Oakville have been completed in this way by Continental Oil Co. and Stanolind Oil & Gas Co. Last week Stanolind had the fifth approved by the Texas Railroad Commission at its 2 L. A. Reagan.

How it's done . . . The 2 L. A. Reagan has a retrievable production packer set above casing perforations opposite the upper (Slick) pay zone at 6,690-6,706 ft. Another packer is set just above the lower (Luling) pay and between the two horizons. The casing is perforated opposite the Luling from 6,866-76 ft.

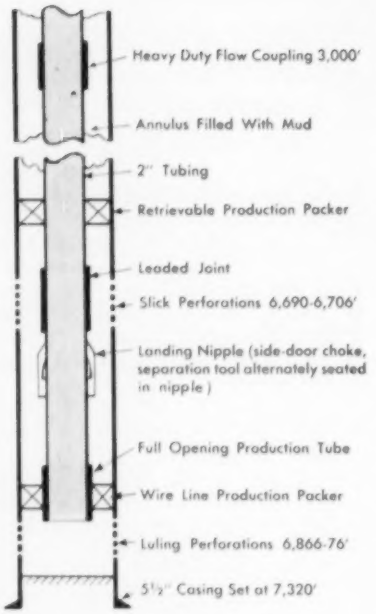
A leaded joint and a full-opening side door choke landing nipple are made up in the tubing string below the Slick. To produce the Slick zone, Stanolind seals off the lower pay by running a separation tool on a wire line and landing it in the nipple. Gas from the Slick flows through the nipple ports and up the tubing.

On the fifteenth of the month, the company switches production to the Luling. The separation tool is pulled and replaced by a side-door choke, which seals off the Slick.

Hard to regulate . . . The Texas Railroad Commission, though approving the applications in Oakville, foresees some difficulty in regulating production of two zones through the same string of tubing.

A commission engineer said that packer leakage tests can't be run and that pressure of the two zones is nearly the same. The commission, he said, will have to base its supervision and regulation on regular tubing-pressure reports.

Stanolind will file monthly flow-rate tests and corresponding flowing tubing pressures. During the tubing-pressure tests, both zones will be produced through the same size choke. The pressure tests will be submitted each time the zones are alternated.


Heavy Duty Flow Coupling 3,000'
Annulus Filled With Mud
2" Tubing
Retrievable Production Packer
Leaded Joint
Slick Perforations 6,690-6,706'
Landing Nipple (side-door choke, separation tool alternately seated in nipple)
Full Opening Production Tube
Wire Line Production Packer
Luling Perforations 6,866-76'
5½" Casing Set at 7,320'

Possible applications . . . It's unlikely that the commission will permit widespread application of this technique due to regulation problems.

It's possible, though, that such dual completions might be permitted when higher ultimate recovery would result. There are no recorded instances of the technique's application to two oil zones. But engineers say there's no physical reason against it.

Jay Simmons, a Dallas independent, has a well similarly equipped to produce oil from one zone and gas from another through one string of tubing. This well is 2 Simmons' Sofia Cotton in South Caesar field of Bee County, also in South Texas.

A similar oil-oil completion might have a future in such fields as the Spraberry Trend Area. Here, a second pay, the Clear Fork, is being extended rapidly over a wide area. It is a rather poor pay, however. Neither it nor the older and deeper Spraberry pay in most cases has sufficient gas in solution with the oil to permit flow through the casing-tubing annulus.

Several producers are shutting-in Clear Fork production when tests show it will not flow through the annulus. They say they cannot afford under the circumstances to use a second string of tubing *(The Oil and Gas Journal, October 24, page 56)*.

Dean Murray, drilling and production superintendent of Hanley Co., Midland, Tex., told the Journal that his firm was following this policy. The company plans to produce the Spraberry zone to exhaustion. It hopes when this point is reached that enough "other firms will be in the same boat" to persuade the Railroad Commission to grant higher allowables for the Clear Fork.

The single-tubing-string dual completion might offer a desirable alternative to companies in this situation.

Exhaust Gas Used

Texaco drops water flood in Montana pilot project

CUT BANK, Mont.—The Texas Co. has begun injecting exhaust gas in a pilot secondary-recovery project in Kevin-Sunburst field, Toole County.

The project marks the first such use of exhaust gas in Montana. Texaco turned to gas injection after a pilot water flood failed. The company announced it discontinued the flood November 1 because of freezing weather.

Texaco had been injecting 450 bbl. of water daily into the Madison formation in a 10-acre area. Tests offered no prospect for increased production.

John H. Moore, assistant Rocky Mountain production manager for the company, said exhaust gas for the new project will be obtained from a compressor engine. About 300,000 cu. ft. daily will be injected into the producing reservoir through four wells.

Moore said plans to use natural gas were abandoned when it was learned 8 cu. ft. of exhaust gas could be produced for the cost of 1 cu. ft. of natural gas.

The Montana Oil and Gas Conservation Commission, in approving the secondary-recovery pilot, said that Texaco may be forced to abandon some of its wells and leases unless production is increased.

No Oil But Plenty of Steam

BAKERSFIELD.—California's first high-pressure steam well in 29 years was being completed last week in volcanic country near Geyserville, Sonoma County.

The Gene Reid Drilling Co. of Bakersfield drilled the 600-ft. well under contract to Thermal Power Co. Thermal plans to harness the steam for electric generation.

Reid used a 6,000-ft. rig equipped with virtually every known pressure-control device. Surface pipe was cemented to 200 ft., then the crew drilled down to 600 ft. At that point the drill

string fell about 10 ft. and live steam started to blow. The well was brought under control without difficulty

After cooling the well with water, the crew pulled the drill pipe and shut off the master gate. The well was bottomed at 612 ft. in a high-pressure steam blow. Another well near Geyserville is still producing steam at the same pressure as when it was completed in 1926.

Old Lines Replaced

Sinclair plans 300-mile crude outlet to Houston

NEW YORK.—Sinclair Pipe Line Co. will build a new 300-mile crude pipeline from Jacksboro in North Central Texas to Houston. It will replace an outmoded, small diameter system now in use.

The project will cost $14 million and require 3 years to complete. Some right-of-way work already has started on a 150-mile section of 18-in. line from Jacksboro to Mexia. However, contract has not been let for building the line. It will replace parallel 8-in. lines now in use between these points.

The Mexia-to-Houston portion of the line will be 20-in. and will replace 8-in. and 12-in. lines. This new line also will connect at Mexia with a Sinclair pipeline from East Texas fields. It now is delivering to the smaller lines leading to Houston.

Sinclair announced the new projects will add needed capacity to move North Texas and East Texas crude to the gulf refining area.

Brazos Absorbed by Dow

HOUSTON.—Brazos Oil & Gas Co., wholly owned subsidiary of Dow Chemical Co., has been absorbed into the parent company.

Brazos will operate as a division of the chemical firm. Brazos, with headquarters in Houston, was formed as a Dow subsidiary in 1946. It operates in California, Michigan, and Texas. Branch offices are located at Sacramento, Calif.; Mount Pleasant, Mich.; and Bay City, Tex.

The Brazos division will continue to explore for and produce oil and gas for use of Dow Chemical. Headquarters will remain in Houston and no personnel changes are involved in the merger, the company announced.

Dr. A. P. Beutel, Dow vice president and general manager of the parent company's Texas division, will be in charge of the Brazos division. He formerly was president of the subsidiary company. L. B. Swan will be general manager of the Brazos division.

Ontario to help build line . . .

. . . Trans-Canada Plans Develop

CALGARY.—Plans for construction of the 2,250-mile Trans-Canada pipeline continue to take shape on several fronts.

The latest developments:

. . . **The provincial government** of Ontario committed itself to furnish $35,000,000 of the $117,000,000 needed to build the north Ontario leg of the all-Canadian line.

Ontario would construct this segment in partnership with the dominion government. The only qualification, as stated by Dana Porter, the provincial treasurer: "We are prepared to do our part on condition that we don't put up one nickel until we have assurance from the federal Government that the whole line will be built."

Ontario apparently is accepting the federal proposal for a publicly owned link in the otherwise privately owned line, although it prefers an all-government project.

The next step: A contract between the federal Government and Trans-Canada Pipe Lines, Ltd. This will permit the company to submit financing plans to the Federal Power Commission, which must pass on Tennessee Gas Transmission Co.'s proposal to import Alberta gas from Trans-Canada at Emerson, Man.

. . . **Trans-Canada won** approval of three applications before the Alberta Petroleum and Natural Gas Conservation Board.

Its deadline for proving financial ability to build the line was extended to April 30 from October 31. The board raised the maximum volume of gas which Trans-Canada can take from Alberta in any one day from 540,000,000 cu. ft. daily to 620,000,000 cu. ft. The board also lifted the ceiling on the amount of gas which could be removed from any one field in the province.

Still another development affecting the pipeline was Alberta Gas Trunk Line Co.'s proposal to trim costs by some $11,000,000 or 20 per cent, by changing the proposed route of the gathering system which will collect gas for Trans-Canada. The company wants the trunk line arms from Homeglen-Rimbey gas and Pincher Creek fields to join the main trunk near Denhart, 110 miles east of Calgary. The original plan was for the branches to terminate 10 miles east of Calgary.

Processing Briefs

COFFEYVILLE, Kans. — Cooperative Refinery Association has let contract for a 5,000-bbl. Platformer and a 3,000-bbl. Unifining unit at its refinery here to Southwestern Engineering Co., Los Angeles. The two units are scheduled to be completed in February, 1956. In addition to engineering and constructing the unit, Southwestern also will fabricate many of the vessels, heat exchangers, and similar equipment in its Los Angeles shop.

DUBACH, La.—A new Platformer has been placed on stream at the Southwest-Feazel gasoline plant here. The unit will be used to boost gasoline output above 89 research octane number for regular grades and 95 for premium. The Platformer is part of a $750,000 construction program which raises the plant's gas and liquids handling capacity to the equivalent of 190,000,000 cu. ft. daily.

BILLINGS, Mont. — Plans for immediate construction of a sulfur-manufacuring plant 4 miles east of here were announced last week by Montana Sulphur & Chemical Co. Hydrogen sulfide gases now being flared at the nearby Carter Oil Co. and Continental Oil Co. refineries will be utilized. Badger Manufacturing Co., Cambridge, Mass., has the design and engineering contract. Proctor Engineering Co., Tulsa, will do the construction.

ST. PAUL, Minn.—Financing of a new 200-ton per day synthetic-ammonia plant by St. Paul Ammonia Products, Inc., has been announced through private placement of $16 million. Of the proceeds, $13.5 million will be used to build the plant about 12 miles south of here.

The new installation will employ the synthesis gas generation process. Natural gas will be used on an interruptible basis with heavy fuel oil for an alternate raw material during high gas demand periods in winter. The plant is scheduled for completion by the end of next year.

ANACORTES, Wash.—Shell Oil Co. has officially accepted its new 50,000-bbl. Anacortes, Wash., refinery from the contractor. About the only phase of this huge refinery not yet in operation is the 22,000-bbl. cat cracker. The company expects to put it on stream later this month. The refinery has been in partial operation for several weeks.

PIPELINES from Masjid-i-Sulaiman, Iran's oldest field, run to the tanker port at Bandar Mashur or to Abadan refinery.

Consortium has work cut out as . . .

. . . Iran Faces Exploration, Development

Paul Swain

This is the second in a series of articles on Iran by the Journal's International Editor. The series outlines the strides made since the consortium took over operations last year. The first article begins on page 86 of the November 7 issue of the Journal.

THE international consortium went back into Iran's oil fields a year ago committed to a definite schedule of raising production to a minimum of 637,000 bbl. daily in 1957.

Iranian Oil Exploration & Producing Co., one of the consortium's two operating companies in Iran, believes it is well on the way after its first year.

It expects to produce an average of 327,000 bbl. daily for 1955. That's its first goal. In 1956, the company is committed to step that up to 498,000 bbl. daily. The following year, the company must have Iran's five major fields producing 637,000 bbl. daily.

For the operating company it means workovers of existing wells, development drilling, wildcatting, reworking existing field production units and building new ones, repairing and renovating field pipelines and building new lines, and expanding loading facilities at Bandar Mashur on the Persian Gulf to take the crude.

The report of the first year's operation made recently by Iranian Oil Participants, Ltd., indicates that the operating company is concentrating on the industry's best field practices. The report points out that some Iranian production comes from one field, Masjid-i-Sulaiman, that in the past 48 years has produced more than 757,000,000 bbl. of oil. More of the output comes from relatively newer fields. It is the operating company's job to coordinate this production so as to produce all the fields at the maximum efficient rate and at the same time meet production commitments.

Here's how that production was proportioned in August:

Masjid-i-Sulaiman	34,000 bbl. daily
Haft Kel	33,000 bbl. daily
Naft Safid	12,000 bbl. daily
Lali	5,600 bbl. daily
Agha Jari	269,000 bbl. daily
	353,600 bbl. daily

Iran's highest production in any one day since the consortium agreement was 431,000 bbl. daily.

Exploration needed . . . The operating company is going to have to discover new fields if it hopes to increase Iranian production and maintain output over a long period of time.

Masjid-i-Sulaiman field is expected to continue producing for a long time.

Iran's Monthly Production Figures

(Barrels daily)

	Gross production	Crude taken by N.I.O.C.	No. of tankers loaded at Mashur
November 1954	186,000	8,500	17
December 1954	172,000		12
January 1955	231,000	21,600	20
February	269,000	35,500	26
March	301,000	41,200	36
April	302,000	15,100	33
May	294,000	3,500	35
June	366,000	17,700	49
July	352,000	15,800	48
August	354,000	14,800	50
September*	367,000	16,800	50
October*	355,000	16,200	50
Total	296,000 B/D	17,100 B/D	426

*September and October figures contain estimates.

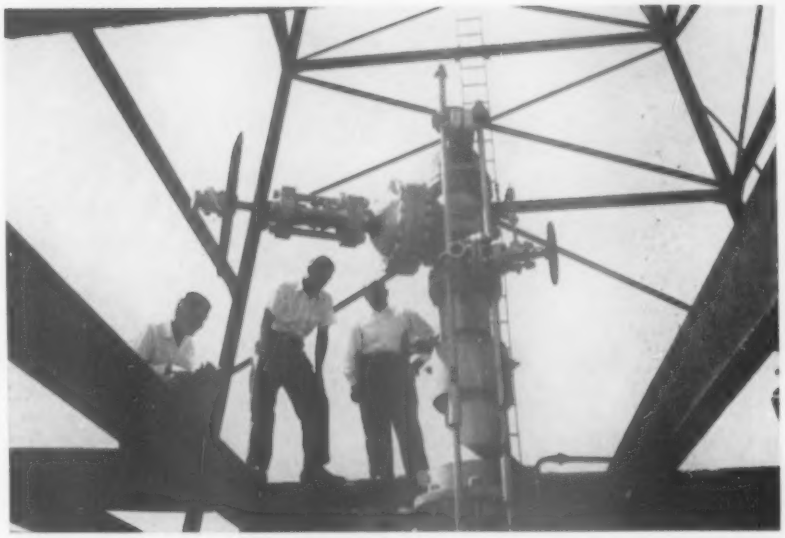
but its output will be at a reduced rate. Agha Jari, discovered in 1937; Naft Safid, discovered in 1934; and Lali, discovered in 1938, are all regarded as relatively new fields.

Gach Saran, Iran's shallow field discovered in 1928, is one of the largest in the world. It is being held in reserve. Iran's fifth producing field, Haft Kel, also was discovered in 1928.

Iranian Oil Exploration expects to supplement the geological and geophysical data it already has with work by a geological exploration party in Khuzistan during the second half of 1956. Some exploratory drilling will be undertaken next year, probably near Ahwaz at the site of a wildcat which suspended drilling in 1951 when the industry was nationalized.

Development drilling will be undertaken in Agha Jari field in 1956. Workover work is scheduled for all the fields next year.

The operating company is now negotiating with drilling contractors for supervisory work contracts to undertake these programs using rigs which are in Iran. Officials say the programs are still in preliminary stages, but unofficial reports are that an American drilling contractor will get the nod to do the work.



WORKOVER of an Agha Jari field well shown here is typical of much of the work already done in Iran and much of it that is yet to be done. Engineers study each well's behavior to determine if it needs deepening or plugging back to cope with modified reservoir conditions.

GENERAL FIELD MANAGER for Iranian Oil Exploration & Producing is John O'Brien, shown here in the Masjid-i-Sulaiman field. O'Brien, a native of Louisiana, is a former employe of The Texas Co. in both North and South America.

What is planned . . . In addition to the exploration and field development, the operating company plans the following for 1956:

. . . A fourth production unit for Agha Jari field.

. . . Fifty miles more of pipelines in all Iran's fields.

. . . A gas pipeline from Agha Jari to Bandar Mashur to link with a line from the port to Abadan. This will allow the refining company to replace fuel oil now burned at the refinery with natural gas. The gas will be purchased from National Iranian Oil Co.

. . . New jetties, tanks, and pumping facilities at Bandar Mashur.

The past year's work . . . Emphasis of the production work during the past year has been on developing existing facilities at Agha Jari and adding to the field's potential.

The biggest single effort is the new multistage field stabilizer which was commissioned in July. The unit is designed to handle 157,000 bbl. of daily crude produced at a wellhead pressure of about 732 psi. Separation is carried out in stages at diminishing pressures to retain the maximum quantity of valuable light ends in the crude.

Stabilized crude from the unit is pumped into a 16-in. line to the Mashur terminal with pumps powered by gas expansion turbines using gas from the high-pressure stages of the unit.

Seven wells in the field feed this unit and a part of the construction was building high-pressure pipelines from the wells to the unit. In addition, 11 miles of 16-in. line from Agha Jari to Bandar Mashur damaged by floods were rebuilt.

Other developments of the past year included:

. . . A power station with two 4,000-kw. generators to furnish power for Masjid-i-Sulaiman field was added. These two generators are powered by gas turbines operating on gas from Naft Safid field, 22 miles away.

. . . A production unit at Haft Kel was rebuilt.

. . . The topping plant at Masjid-i-Sulaiman field was recommissioned. This plant, with a throughput of 20,000 bbl. daily, will serve internal Iran's fuel oil markets at a lower cost than was possible with Abadan.

Iranian Oil Participants emphasized the "qualities" of the Iranian members of the staff of the producing and exploration company in its report. The report points out that in addition to the three Iranian members of the seven-man board of Iranian Oil Exploration & Producing, two of the three members of the company's coordinating group and five of the 12 departmental managers are Iranians. All the field superintendents are Iranians.

Pakistan Line Set

Southern Punjab will get gas over Sui-Multan line

A SECOND major Pakistan area will be supplied with natural gas from the Sui gas field before the end of 1956.

Construction of a 193-mile, 16-in. line linking the field with Multan in southern Punjab is expected to begin within the next 6 months. The job will take about 6 months to complete.

A project of the government, the line will be built by Pakistan Constructors, the same contractors who recently completed the 348-mile Sui-to-Karachi line. The company is owned 75 per cent by Morrison Knudsen, Boise, Idaho, and 25 per cent by William Press, Ltd., London. Half the pipe has already been ordered from Stewarts & Lloyds, London. The remainder will be furnished by an Italian firm.

The new gas line should give a solid boost to the Pakistan Government's plans for industrial development in southern Punjab. The government has plans for a 316,000-kw. power plant at Multan to operate on natural gas. The German steel firm, Krupps, is studying the possibility of an iron and steel plant at Kot Adu in the same area.

The Sui field was discovered in October 1952 by Burmah Oil Co. while drilling for oil in the heart of the arid Baluchistan province. Tremendous gas reserves developed since the discovery have been estimated at 4 trillion cubic feet.

Guatemala Sets Deadline

Oil companies seeking exploration concessions in Guatemala have until November 23 to file for permits, President Carlos Castillo Armas said last week in Houston.

Armas said his administration will expedite handling of all applications. He was unable to say when permits will be cleared. But he indicated the first concessions may be granted within a month after the November 23 deadline.

Preference, he said, will be given companies making the highest per-acre bids and assuring speedy operations.

Israel Buys Red Oil

Deal signed as tests made on first Israeli discovery

ISRAEL last week signed a contract to buy 350,000 to 400,000 tons of crude and fuel oil from Russia. The contract also calls for shipment of 15,000 tons of citrus fruits and bananas to Russia.

The deal was signed in Moscow as Israel's first oil discovery was being prepared for production tests.

The country's first commercial discovery was made late last month when Lapidoth Israel Oil Co. and Israel Oil Prospectors, Ltd., deepened a wildcat at Hufeiqat. The location had been abandoned by Iraq Petroleum Co. in 1948 when Arab-Israeli hostilities began.

The well tested an estimated 50 bbl. an hour from a 7-ft. sand at 4,906 ft. *(The Oil and Gas Journal, October 3, page 96).* Drilling was resumed on the well and another productive formation was encountered 40 ft. below the first *(The Oil and Gas Journal, October 17, page 103).*

Both zones will undergo production tests this week. The operators say they will drill two stepout wells almost immediately. The discovery has been designated Heletz 1.

The optimistic operators are already laying a pipeline from Heletz 1 to Ashkelon and the railroad so that crude can be hauled to the Haifa refinery by railcar. The 5-mile pipeline is expected to be laid in about 3 weeks.

The 87,000-bbl. daily refinery of Consolidate Refineries, Ltd. (Shell-B.P.), is now operated at only about 20 per cent of capacity on imported crude. The plant refines just enough to meet Israel's products needs. The country is entirely dependent on oil and oil products for all fuel and power.

Ecuador Deal Compromised

The two companies which have been dickering to buy Anglo-Ecuadorian Oilfields, Ltd., for the past 2 months will share equal control of Ecuador's largest single oil producer.

Reports from London last week indicated that Lobitos Oilfields, Ltd., and South American Gold & Platinum Co., an American firm, have reached a compromise calling for joint ownership of Anglo-Ecuadorian. The plan is subject to approval of Anglo-Ecuadorian stockholders, but this is regarded as a formality.

South American Gold & Platinum, which already owns about 10 per cent of the Ecuadorian company, offered the equivalent of $7 a share for 51 per cent of the company in September. Lobitos Oilfields, also a part owner of the Ecuadorian firm, countered with a better offer *(The Oil and Gas Journal, October 24, page 76).* The compromise will give Ecuadorian's present shareholders Lobitos stock and cash equalling $8.40 a share of their stock.

International Briefs

A new gas-recovery plant with a capacity of about 1,500 bbl. daily of butane and propane has just gone on stream at the Hamburg refinery of B. P. Benzin und Petroleum-GmbH (British Petroleum).

The output of the new unit will be used for German domestic and industrial uses and for the manufacture of chemicals. The Hamburg refinery has a crude capacity of 28,000 bbl. daily.

The supertanker, S.S. New Jersey Sun, has sailed on a 62-day round-the-world cruise. It will pick up Sumatra crude for the U.S. West Coast and then haul heavy California residual back to the East Coast.

Alkylation facilities designed to produce 2,600 bbl. daily of aviation gasoline will be added to British Petroleum Co., Ltd.'s, refinery at Kent on the Isle of Grain. The unit will cost $18,200,000. It is expected to be in operation by 1958.

B.P. says the new unit is necessary because of growing demand for fuel for turbine-engined aircraft in addition to expanding outlets for high octane aviation gasoline. Some avgas production from Abadan is expected, but B.P. says it needs alkylation facilities west of Suez.

Reprints Available—17 Page, 2-Color Booklet

Send 50 cents to Reader Service Dept., The Oil and Gas Journal, P. O. Box 1260, Tulsa, Okla., for reprint copy of "Why Was My Well Dry? (Or Was It?)." This is being printed as a 17-page, 2-color booklet.

WHY WAS MY WELL DRY ?

(or was it ?)

Pity the poor guy we show here, for he just drilled a dry hole. His bankroll's gone and it looks as though he will have to mortgage his house.

"What happened?" he asked. "What went wrong? I spent plenty on seismic surveys and on checking out the geology. Boy, it looked as if I was right on a pay structure. Well logs showed an interesting formation and I even found show of oil. But after I set pipe, I got so much salt water I'm seasick. I logged the last thousand feet, but nothing else is promising. We're as deep as the rig will go, so I might as well plug the hole."

Well, we liked this guy and wanted to sympathize with his tough luck. But it looked as if he might have missed some bets somewhere. So we sat down with the experts (over 114 individuals) and tried to figure out why he didn't find his pay zone.

The most obvious reason the well was dry was that there wasn't any oil there. So we checked the geophysical and geological data. Maybe he missed the structure; maybe the well is downdip from the oil. Or could be the well isn't deep enough.

Then we examined his drilling procedure, his well logs and tests. No logs above 5,500 ft. Could be bad mud invasion. Cement job questionable.

By the time we got through listing all the things that could have gone wrong we had a pretty long list.

"Say, I didn't realize so many things could go wrong when I set out to drill this well," the guy moaned. "There must be a lot of other fellows who'd like to know these points. This list ought to be checked by everyone starting out to locate and drill a well. I'm glad to find out so many reasons why my well was dry. But now I'm wondering—was it?"

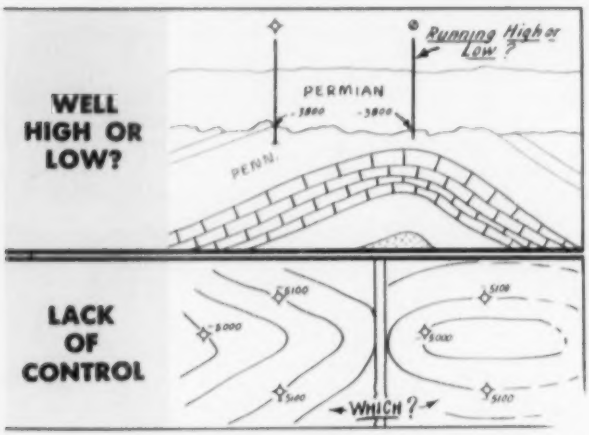
In the pages that follow we give you a set of charts and a quick check list of factors that could cause you to miss a producer. The list is divided up into some general groupings. Read down this list and see if the symptoms fit your well. Maybe you can pin point your trouble—and **you** may wonder—"Was my well really dry?"

AN ORIGINAL COPYRIGHTED FEATURE OF OIL AND GAS JOURNAL

GEOLOGICAL . . . .

INSUFFICIENT DATA

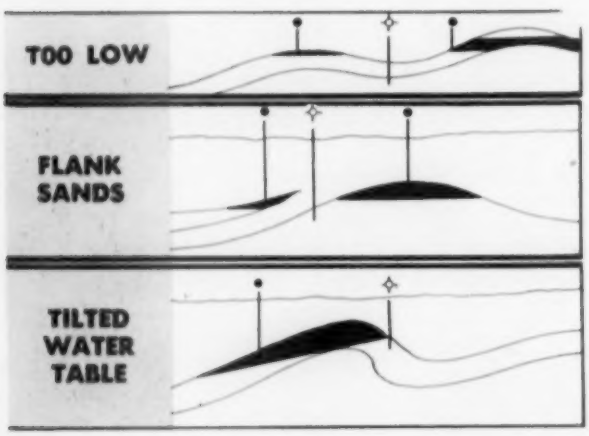
PROBLEM



DIAGNOSIS CHECKLIST

- ☐ Is the well running "high" at total depth compared to surrounding wells?
- ☐ Did you recognize a reliable marker?
- ☐ Is there any significant thinning of formations in your well to indicate it is on a structure?
- ☐ Are there enough subsurface data to support the prospect?
- ☐ Do the seismic maps confirm the subsurface interpretation?

LOCATION OFF STRUCTURE



- ☐ Are you too far downdip for production?
- ☐ Do isopach maps show marked thinning over the structure? If so, have downdip wells picked up any flank sands?
- ☐ Have you considered the effect of a tilted water table?
- ☐ Will the tilted water table affect your location?

Staking the wildcat location falls upon the geologist in many companies. And the location is as reliable as the geological data used. A few hours checking the validity of the map may eliminate a dry hole. Here the Journal lists some of the common causes of dry holes. In many instances the flaw can be recognized before spudding; or a dry hole can be converted into valuable geological information that points to a nearby oil field. Or the dry hole can be a producer if shallow pay zones are present. Don't overlook any bets while drilling your well, even if the initial objective tests salt water.

Did you consider all the factors listed below before you staked your location?

CURE OR TREATMENT

High or low well . . . Is the well running high or low with respect to other wells in the vicinity? Actually, a low well may be just as important as a high well. It may produce on the downthrown side of a fault. The subsurface data on your well can be checked quickly against the seismic data and with nearby wells. The local geology will determine the wisdom of abandoning low well. On the other hand, a low well on shallow beds may become a high well by cutting a fault or an unconformity. Consider all possibilities before plugging your well.

Oddly enough, "low" wells can produce. There may be an unmapped fault between the producing area and your test, or unsuspected flank sands can be a life saver. Around the flanks of salt domes, low producers are brought in, offsetting higher dry holes.

Incorrect correlations may indicate that the well is low, but a careful comparison of the electric log against those from wells in the area may uncover the mistake in time. Or it may be necessary to drill another 200 ft. to establish valid correlations.

Marked thinning between geological markers may be the only clue to a "high" well, especially if well control is sparse. In many areas this is an excellent indication of structure.

Lack of control . . . Invariably, when data are weak or lacking, several geological interpretations are possible. The wrong one can mean a dry hole. It is an easy matter to shoot a couple of seismic lines to eliminate the incipient dry hole. Or a careful check of the formation tops should confirm original interpretation.

Today scientific exploration can eliminate much of the guesswork and reduce the number of dry holes.

Too low to produce . . . Good shows of oil in a plugged well may be the tip-off to an oil field. Your dry hole could be on a very attractive structure but the well was too low to produce. Additional seismic work may be the answer to evaluate the structure before drilling another well. Or a continuous-dipmeter survey will tell you if you can get above the water.

Your low well may even be on a separate structure from the updip dry holes; and if this is so, it could produce if drilled deeper to the primary objective. Usually the seismic data will support or eliminate this conclusion.

Flank sands . . . On some large structures, flank sands are deposited as the structure forms. These are absent on the crest of the structure, but a downdip well can find them and produce. Your low "dry hole" may top such pays. Check this possibility by examining well logs updip and downdip from your well. Isopach maps provide valuable data for this type of play.

Normally these sands develop in "thick" areas that are clearly shown in isopachs. Stratigraphic cross-sections also may be the tipoff for this type of play. But these possibilities should be recognized before spotting the location rather than "hoped for" when it comes time to plug the well.

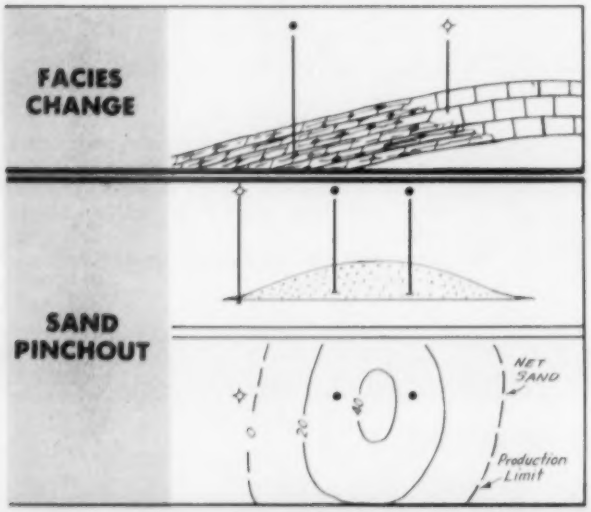
Remember that it is a rare large structure that has only one pay zone!

Tilted water table . . . Wells drilled on the crest of a foothills fold may be dry, but flank wells produce. This is caused by a tilted water table. Water entering the producing zone, usually at the outcrop, forces the oil out of the crest of the structure and this oil is found on the basinward flank. Several Rocky Mountain fields exhibit this phenomenon.

PAY LACKS POROSITY-PERMEABILITY

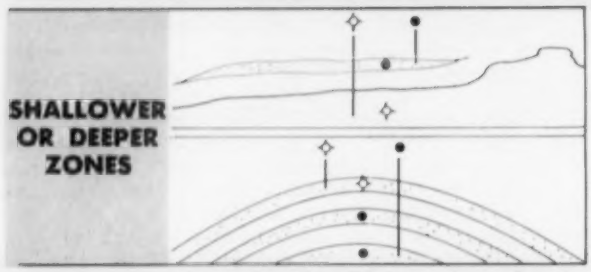
PROBLEM

DIAGNOSIS CHECKLIST



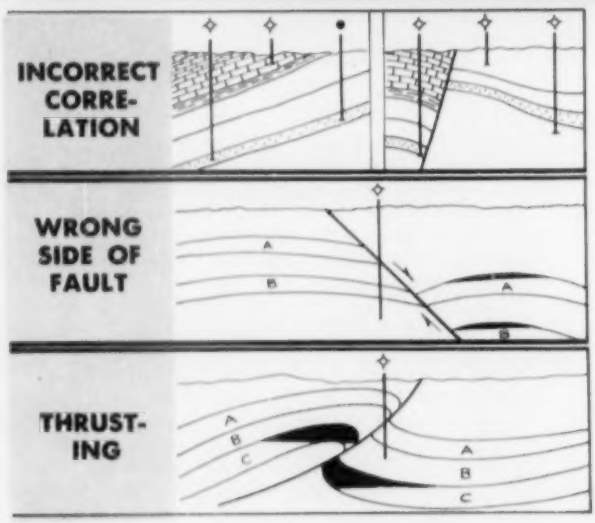
- ☐ Is the pay zone present in your well?
- ☐ Is the interval tight and nonproductive? Will fracturing help?
- ☐ Is production controlled by sand conditions?
- ☐ Did the sand pinchout between your well and production?
- ☐ Does an unconformity control production?
- ☐ Are you "too high" for production?

IGNORED SHALLOWER OR DEEPER PAYS!



- ☐ Did the geologist examine cuttings from surface to total depth of shows?
- ☐ Do shallow or deep zones produce in nearby fields?
- ☐ Is the well "running high" at total depth?

INCORRECT INTERPRETATIONS



- ☐ Do your geologists agree on the correlations?
- ☐ Are the correlations confirmed by sample tops on your well?
- ☐ Did your well cut a fault?
- ☐ Were any potential pay zones cut out?
- ☐ Were any formations repeated?
- ☐ Do the continuous dipmeter data show critical dip away from the thrust fault?

CURE OR TREATMENT

Porosity-permeability traps are an important source of new oil. In the past many of these have been accidentally discovered, but today geologists are finding them by careful study. This type of production is easy to overlook, particularly if you fail to evaluate the potential pay zone.

Facies changes . . . Stratigraphy is an important factor in oil accumulation. Changes in lithology can mean the difference between a producer and a dry hole. A porous dolomite may grade into a tight limestone from well to well. Or the reverse may be true. These changes are difficult to forecast and a test may be the only answer.

Sand pinchout . . . Deltas, shore lines, sand bars, and river channels are all potential reservoirs. But this type of production is hard to find and develop. The pay sand can grade into shale in a few hundred feet. More often than not, such production is not related directly to structure. Detailed isopach maps and facies maps provide a better picture than does the structural map.

Learn what controls production before spudding your well. An inviting structural map may be misleading and be the cause of your dry hole.

Your dry hole may be caused by an unconformity that has eliminated the pay sand. This is a common occurrence; and the great East Texas field produces from this type of trap. Comparison of well logs in the area, however, should show the updip limit of the sand. Or an unconformity may control flank production on a large structure. Reservoirs trapped against the unconformity may produce even though the well is off structure. On "wedge-edge" sand production, you need close well control and detailed geological study.

Under favorable conditions, detailed seismic work can map the sand pinchout. If the production and pinchout are associated with an unconformity, the seismic work can map the dip of the producing zone as well as the dip of the beds above and below the unconformity. It is then a simple matter to determine the approximate updip limit of the pay sand.

Shallower zones . . . Too often the oil company's attention is focused on a particular pay zone like the Wilcox sand of Central and North Oklahoma. The well site geologist only checks samples when this objective is approached. The upshot has been that many of the shallower zones were overlooked.

Mud-logging units can detect many of these zones. Or the well site geologist can spot shows and test them as the well is drilled. Careful electric log study may show whether such sands will produce.

Deeper sands . . . Consider all possible pay zones before plugging your well. Ask yourself, "Are there any deeper sands worth testing?" A high but dry Devonian test may be right over an Ellenburger producing structure. In the Rockies, the Phosphoria may be tight, but there are still the Tensleep and Madison below. Check the local and regional geology. See what zones are producing in the nearby oil fields. The fact that shallow sands are dry does not rule out the deeper possibilities at your location.

Incorrect correlation . . . It is very easy to correlate incorrectly where the stratigraphy is complex and rapid facies changes occur. Correlations within limestone units are exceptionally difficult at times, but a reliable breakdown can be made using insoluble residues. (These residues are what remains of the limestone or dolomite after the rock has been digested in hot hydrochloric acid.)

Recognition of granite and granite wash presents a critical problem, but one that is easily solved. Magnetic susceptibility tests usually can be made rapidly on cuttings and cores. And the wash is identified by its relatively low magnetic susceptibility or the measure of the rock's capacity to be magnetized.

Wrong side of fault . . . Occasionally a well will pass through a fault and cut out the pay zone. Most fault traps require detailed study, for a well oftentimes can only test one pay zone; the other horizons are poorly located with respect to the fault and will not produce.

If faulting occurred in your dry hole, you may be able to set a whipstock and get production. Or the faulting in your well coupled with seismic work may lead to an oil field.

Thrusting . . . Usually thrusting can be recognized when wells repeat formations previously drilled but this does not always mean you have a dry hole. Production can and does occur below thrust faults. A continuous-dipmeter survey will give you a quick check on the subthrust possibilities. Deeper beds may produce if conditions are favorable. Be sure you have investigated these possibilities before plugging your well.

Sample running is becoming a lost art because geologists rely heavily on electric-log interpretation. But careful sample examination is a must, particularly in areas where either the stratigraphy or the structure is exceptionally complex.

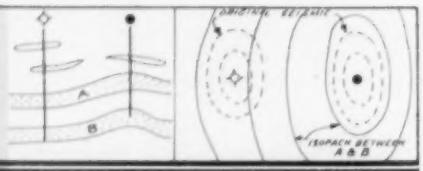
GEOPHYSICAL . . . .

VELOCITY CONTROL

PROBLEM

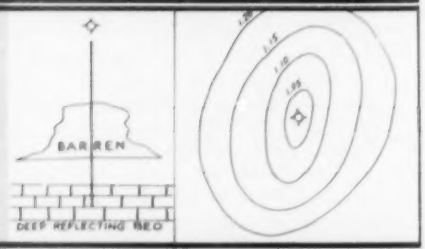
DIAGNOSIS CHECKLIST

FACIES CHANGE



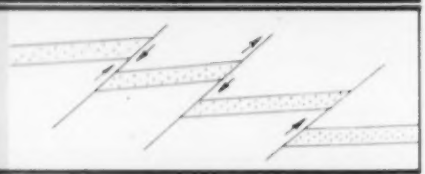
- ☐ Are there rapid changes in lithology?
- ☐ Do isopach or isotime maps show thinning over the prospect?

REEFING



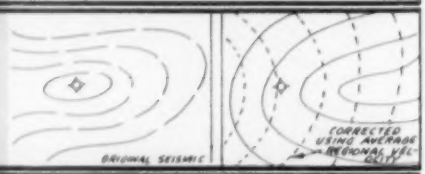
- ☐ Does well control indicate reefing?
- ☐ Is there any seismic evidence of reefing?
- ☐ Is the structural relief on the deep lead greater than any errors caused by reefing?

THRUST FAULTING



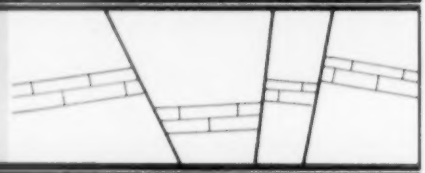
- ☐ Do you suspect thrusting?
- ☐ Did the seismic and subsurface data conform?

REGIONAL VELOCITY CONTROL



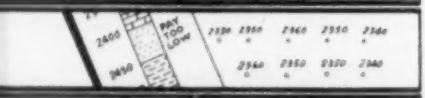
- ☐ Did you tie your survey to wells in the area?
- ☐ Do well velocity surveys show regional or local variation in velocity?

FAULT BLOCKS



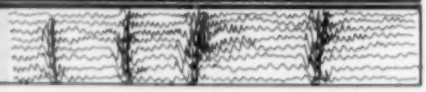
- ☐ Have wells in the area cut faults?
- ☐ Did your seismic loops close?

PSEUDO-ANOMALY



- ☐ Did the formation tops on your well check with the seismic data?

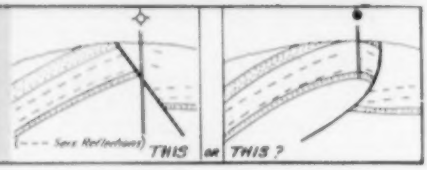
NORMAL MOVEOUT



- ☐ Did you correct for normal moveout?

INCORRECT DATA OR INTERPRETATIONS

FAULTING



- ☐ Did you coordinate the geological and geophysical data?
- ☐ Did you do enough detailed "shooting" to map the faulting?

Geophysics is the backbone of present-day exploration, but geophysics cannot tell you if oil is present. It serves as a guide, and when properly handled, is a very effective method for locating potential oil fields. But even geophysics is not infallible. Failure to recognize any one of a score of pitfalls may mean a duster instead of a producer.

Geophysics, to be successful, requires a carefully planned and coordinated program from start to finish. Tie all the geological and seismic data together. Haphazard shooting with wrong field techniques or seismic interpretations based upon a sketchy knowledge of local or regional geology can bring you more than your share of dry holes.

CURE OR TREATMENT

Facies changes . . . Variations in lithology can cause false seismic structures or pseudoanomalies. These variations can be recognized more often than not by carefully examining well logs in the locality of the prospect. Probably the most troublesome situation arises when the thickness of high-velocity material such as salt varies rapidly. In strictly wildcat country, of course, it is difficult to recognize this problem. With additional well control, however, the problem can be solved.

One of the most effective methods of eliminating the effect of facies changes is to map the interval between two geological markers **below** the salt section. Any marked thinning of this interval may well be translated into a drillable prospect. Oil companies have used this method with considerable success in central and western Kansas where high-velocity salt and anhydrite obscure the true subsurface structure. Similarly, the change of a limestone to a shale will cause peculiar seismic interpretations.

Reefing . . . Productive reefs are a joy to the oil finder, but the unrecognized shallow barren reef may be the cause of your dry hole. Reef material has a higher seismic velocity than the surrounding shales. As a consequence, seismic energy reaches a reflecting bed below the reef in less time than it takes to reach the same bed where the reef is absent (assuming the depth is the same). When these times are converted to depths using an average velocity, a false structure is mapped below the reef. This can be a very effective method of outlining the reef.

If the lead still exists after suitable corrections have been made, it is a worth-while prospect. Many fields in West and West Central Texas have deeper production below known reefs. And in reef prospecting, the oil companies often consider that the deep false anomaly caused by the reef is excellent evidence of the reef itself.

Thrust faulting . . . Invariably thrust faulting introduces velocity problems that may explain your dry hole. High-velocity beds can overlie lower-velocity formations. Frequently this condition is completely masked by Tertiary gravels or Cretaceous and Permian sediments as happens in southern Oklahoma. The solution to your problem here is very close coordination between the geologist and geophysicist. Subsurface and seismic data should be scanned carefully and integrated to give a picture that fits both the local and regional pattern.

Regional velocity changes . . . Nonexistent structures can be mapped because regional velocity problems were ignored. Actually these can be recognized if wells in the area are shot for velocity control or logged with the new velocity logger. During the seismic program, it is prudent policy to tie the seismic survey to all wells in the vicinity of the prospect. This gives a quick check on the validity of the lead and will show any velocity problems. In wildcat country, however, regional velocity changes may cause serious errors and result in dry holes. Thus it is wise to run a continuous velocity survey on all rank wildcats. This is especially true during the early life of an oil province.

Fault blocks . . . Velocity problems arise in areas where fault blocks have different average velocities. Subsurface control will give a clue to the presence of faulting. Velocity surveys will aid the interpreter in using the correct velocity to determine the depths to the producing zones. Failure to recognize this problem may explain your dry hole. On the other hand, once the faulting is recognized, it may serve as a trap for a future oil field.

Pseudoanomalies . . . These are seismic leads that do not reflect accurately the true geologic structure. Many of them may appear to be drillable prospects and may account for the dry hole. The pseudoanomaly may be caused by any one of the items listed above, or there may be some other cause such as weathering, igneous intrusives, etc.

Normal movement . . . Because of the geometry of reflection shooting, there appears to be dip in both directions from the shot point although the reflecting bed is actually flat. This effect is especially marked in the shallower beds and decreases with depth. Today, however, this phenomenon is well recognized and is corrected for.

Many dry holes have been plugged on first-class seismic leads; later drilling has uncovered an oil field.

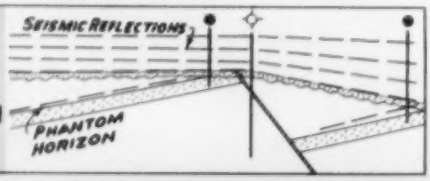
Today, interpretation of geophysical work offers a real challenge to the oil finder. The simple, obvious structures have been mapped. But a review of old work may uncover additional leads.

Faulting . . . Both seismic records and wells in the area will give a clue to the presence of faulting. Closed loop shooting is one answer to pinning down a fault. Another way is to tie the seismic survey to all wells in the area. Close coordination between the geologist and the geophysicist may mean the difference between a pro-

PROBLEM

DIAGNOSIS CHECKLIST

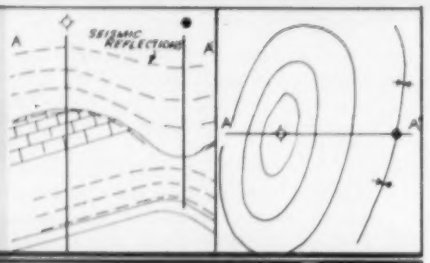
PICKED WRONG REFLECTION



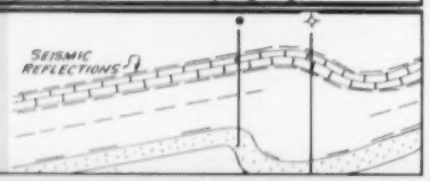
- [ ] Did you tie your seismic survey to nearby wells?
- [ ] Did you review the seismic data to see if the loops tied without error?

STRUCTURE CHANGES WITH DEPTH

UNCONFORMITIES



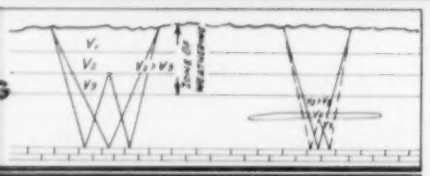
SHIFT OF AXIS



- [ ] Does the geologic history of the area show evidence of unconformities?
- [ ] Do the producing fields show any change in structure below the unconformity?
- [ ] Does the continuous dipmeter survey register any change in dip below the unconformity?
- [ ] Is your seismic map based on a reflection near the pay horizon?
- [ ] Do structures in the area shift with depth?

POOR ELEVATION OR WEATHERING CONTROL

POOR WEATHERING CONTROL

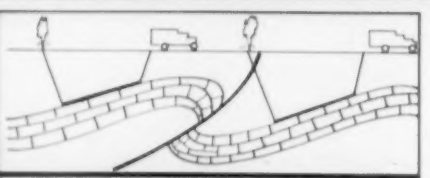


TOPOGRAPHY

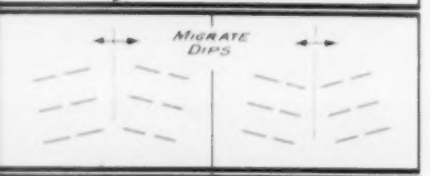
- [ ] Did you check your weathering velocities in the field?
- [ ] Does the weathering correction vary greatly from shot point to shot point?
- [ ] Is the terrain on the prospect rugged?

INCORRECT FIELD TECHNIQUES

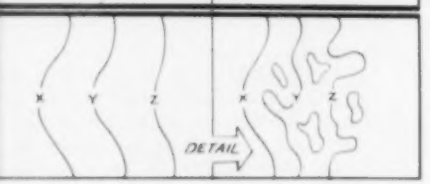
WRONG TYPE OF SHOOTING



STEEP DIPS



DETAILING



- [ ] Does the area require special field techniques?
- [ ] Did you orient your seismic lines correctly to map the prospect?
- [ ] Are you in steep-dip country?
- [ ] Did you obtain dip data with four-way spreads?
- [ ] Are you looking for a microstructure or "pimple"?
- [ ] Did you shoot enough detail to map the lead correctly?

ducer and a dry hole. Detailed seismic work, although it may appear expensive at the time, is an effective way of picking up faulting.

Picked wrong reflection . . . Errors such as these are not too common and usually can be eliminated by carefully checking the seismic data.

Shallow seismic maps can be very misleading, especially if used to spot deep tests. Check all mappable horizons. A phantom horizon on a deep bed may be more reliable than a map based on a strong shallow reflection. Unconformities, facies changes, weathering problems or reefing can completely alter the deeper structural picture.

Unconformities . . . Crossing an unconformity can be like stepping into another world, geologically speaking. Simple low-relief anticlines may become complexly folded and faulted structures.

Seismic maps of the unconformity surface are similar to topographic maps. They may give some indication of the deeper structural pattern or they may be erroneous. Failure to recognize the unconformity may mean a dry hole. Good shallow seismic data are not always the answer to finding a new oil field. Mediocre deep reflections may provide the needed information. Sometimes it is necessary to sacrifice the reliable shallow data in favor of the weaker reflections below.

Axis shifts . . . In many areas the deep structure does not coincide with the shallow lead. The crest of the anticline shifts. And a well drilled on the top of the shallow anticline may wind up as a dry hole, possibly only one location away from production. A sound knowledge of regional and local geology provides the tipoff to these conditions. Continuous dipmeter surveys are considered first-hand information, especially if steeply dipping beds are drilled. Tie all the data together. You may convert your dry hole into oil field instead of dropped leases that a more astute operator will drill and develop.

Failure to recognize weathering problems . . . Occasionally weathering can present a serious problem, especially if it is not recognized. It may be necessary to run field tests to check this and take the necessary precautions to eliminate it. Two and three-layer weathering conditions can exist. Sometimes the near-surface layers may cause multiple reflections that cause trouble. These occur when the seismic energy is reflected from the same bed two or more times after traveling different paths. If the reflector mapped is an unconformity, the multiple reflections would indicate that the horizons below the unconformity are essentially parallel to the unconformity surface.

Elevation . . . In rough country it may be necessary to check the elevation of each geophone.

Wrong type of shooting . . . Pay particular attention to designing the seismic program in steep-dip country. A poorly designed program can mean a dry hole. Many operators favor shooting seismic lines at right angles to the regional strike to insure mapping the inferred structures. Closed loop shooting may be ineffective in mapping complex structures. Experience has shown that closely spaced shot holes (i.e., about 600 ft. apart) and dip shooting can be highly successful in mapping complex areas. But each complex area has specific problems and requires a particular seismic program.

Geophysics is not always the solution to an exploration problem. In isolated areas the seismic surveys cannot map the suspected structures because of field conditions, or core drilling may provide more reliable data at less cost.

Know these problems and work toward their solution. The result may be a new oil field rather than a dry hole.

Steep dips . . . Special shooting techniques are often needed in areas of steep dip. The reflection method can be successful but in western Canada refraction work is being used in the overthrust and foothills belts.

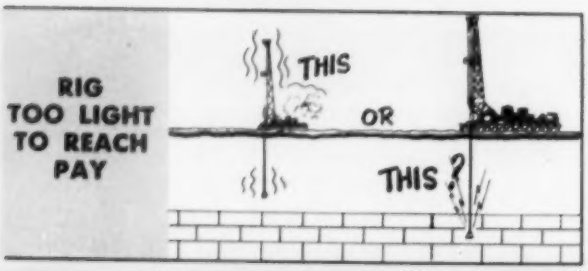
Bear in mind that steep dips require special techniques in handling data. If the dips at 5,000 ft. are 45°, the shot point must be placed about a mile downdip from the prospect to insure mapping the feature. Dips must be properly plotted in their true subsurface position to obtain a correct seismic picture.

Detailing . . . Reconnaissance shooting frequently will not map small leads that cover only 160 to 300 acres. Later detailed work can map these and uncover a small but prolific oil field. Wilcox pimples in Oklahoma that cover less than 100 acres, for example, are an attractive target with reserves of 15,000 bbl. per acre or more.

DRILLING AND TESTING . . .

DRILL RIG OR EQUIPMENT INADEQUATE

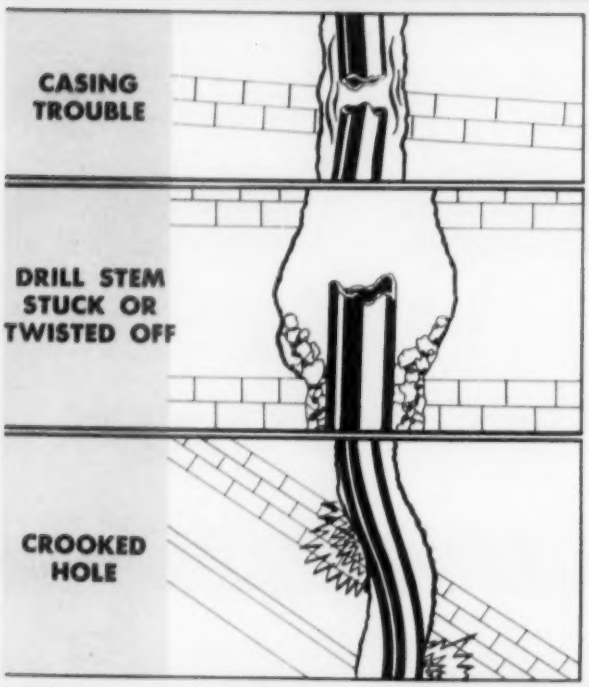
PROBLEM



DIAGNOSIS CHECKLIST

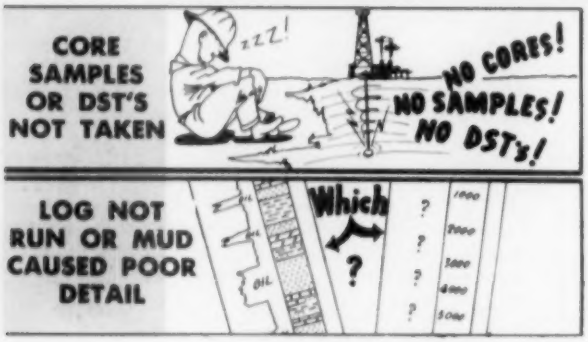
- ☐ Do prospective oil and gas pays lie below present total depth?
- ☐ Objective pay formations below depth rating of rig?
- ☐ Was your drill string lost—equipment failed or poor mud circulation?

MECHANICAL DIFFICULTIES BEFORE T.D.



- ☐ Was casing-handling equipment inadequate or in poor condition?
- ☐ Inadequate cementing? Casing parted? Trouble with couplings?
- ☐ Did you have high torque while drilling?
- ☐ Did pipe drag on trips?
- ☐ Did the bottom of the hole fill back during trips?
- ☐ Were formations dipping rapidly?
- ☐ Did you find rapid change in hole deviation in places?
- ☐ Drilling weight too high? Hole devintion too large?

PAY ZONES NOT LOGGED



- ☐ Did you overlook possible test intervals?
- ☐ Not enough log analysis to show zones to be tested?
- ☐ Were nonlogged zones potential pays?
- ☐ Hole didn't reach pay zone?

CURE OR TREATMENT

Rig too light to reach pay . . . Scheduling rigs to operate below rated depth provides no margin of safety should it be necessary to go deeper to penetrate the pay. It is true that many rigs operate at greater depths than they are rated but failures may happen unexpectedly.

Rigs are rated initially for stresses considerably below yield stresses. But with continued service all working metal parts tend to be fatigued and normal stresses and vibrations of drilling may cause them to break. Loss of the pipe in the hole because of mast or line failure is a good way to lose the hole. Don't crowd the yield strength of the drilling equipment.

After it becomes obvious that the rig on the hole is incapable of drilling to projected depth, either the hole may be in bad shape because of inadequate mud circulation or trouble may occur when rigs are switched. It is much better that you start off with a rig that is adequate to go below scheduled depth if necessary.

Casing trouble . . . Even with good casing string design, improper handling or care of casing can damage the string and prevent further drilling operations.

Unexpected casing failure may occur in the upper part of the hole where the casing is not cemented and therefore unsupported. Drill-pipe vibration because of a crooked string or kelly will cause fatigue at the joints and possibly complete tensile failure.

This type of failure can also occur when casing protectors are not used to prevent pounding by tool joints. Don't use hard-faced tool joints inside casing. They wear casing so fast you are inviting trouble.

Drill-stem stuck or twisted off . . . Drill-stem sticking is caused by a number of hole conditions. Caving or sloughing formations and key seats are generally recognized hazards but thick wall-cake, side-wall sticking, and cuttings bridges can be just as dangerous.

Proper control of wall cake should include maintenance of low-strength cake as well as low-water-loss mud. The lower the cake strength, the more easily it is eroded and the thinner it will be during drilling operations.

Side-wall sticking results from thick filter cake. It occurs when the pipe rubs the face of a permeable formation and the cake forms a gasket on each side. The full pressure difference between mud column and formation holds the pipe against the wall.

Cuttings bridges are often the result of incomplete circulation of cuttings from the hole. Mud velocity is reduced within the hole enlargements and large cuttings won't rise. Large quantities of cuttings can accumulate rapidly and when circulation is suspended for any short period, the cuttings may fall down into the gage section and stick the pipe.

Crooked-hole stuck pipe or casing . . . Crooked holes may result from highly dipping, rapidly changing formations or from too much weight on the bit. Dog legs may form when deviated holes are brought back to vertical too rapidly. Key seats form in the dog legs and stick the drill collars or casing unless they are reamed out.

If very much hole is crooked, the contractor cannot ream it sufficiently to allow casing to run freely to bottom. Proper control of hole deviation during drilling by careful use of weight, drill collars, and stabilizers is the best way to prevent trouble. In crooked-hole country, consider drilling large holes and using large drill collars.

Don't lose you hole because of a poor drilling program!

Core samples or drill-stem tests not taken . . . In many types of formations distinction of pay zones on the basis of electric logs alone is difficult. In shaly sands, hard limestone formations, or where there is extensive filtrate invasion, cores or drill-stem tests are necessary for conclusive indication of oil.

Side-wall cores should be taken in all possible pay formations indicated on the logs. When logs and cores show a possibility of oil, further confirmation should be obtained by running a drill-stem test. Early testing will many times give good results, where later tests are negative because of formation damage.

Logs not run or mud caused poor detail . . . Don't economize by not running logs and pass up good pays. Although cuttings and drilling rate help to find permeable zones, they are but partial assurance of the fluid that is present. That dry zone you found may not even be the real pay zone.

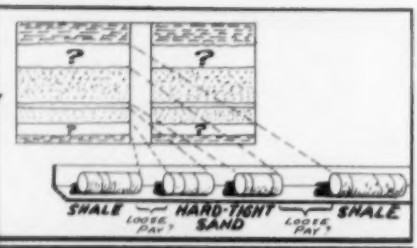
Deep wells are sometimes drilled considerably below shallow permeable zones before logs are taken. Filtrate invasion renders it difficult to determine any shallow pay zones. Several electric log runs will solve this. Always consider running some of the special logs designed and available to meet your problem.

INCONCLUSIVE DATA FOR PAY ZONES

PROBLEM

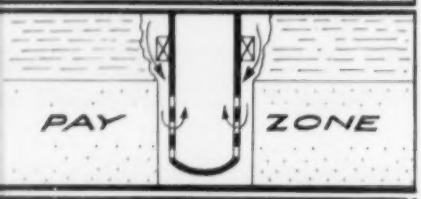
DIAGNOSIS CHECKLIST

TOO MANY CORE LOSSES



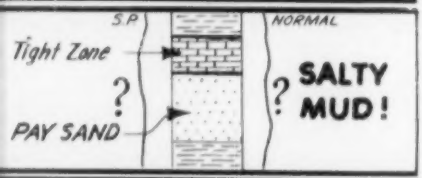
- ☐ Were cores dropped because of faulty core catcher?
- ☐ Did core barrel "ball up" in pay zone?
- ☐ Poor side-wall core recovery?

DST'S PRODUCED MUD OR WATER



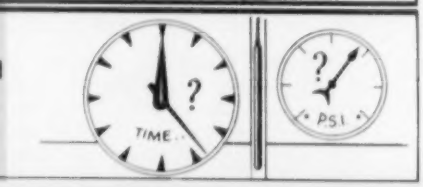
- ☐ Packers leaked? Set in shale or weak formation?
- ☐ Too much hole open? Water zones exposed?

WRONG TYPE OF LOGS RUN



- ☐ Was mud salty? Mud and connate-water resistivities similar?
- ☐ Pay section thin—no resistivity kicks?

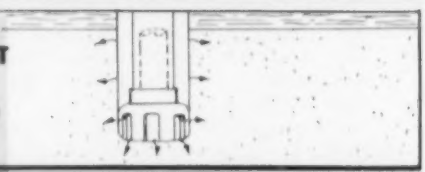
DST NOT OPEN LONG ENOUGH



- ☐ Did well make filtrate water only?
- ☐ Initial pressure high—very little fill-up?

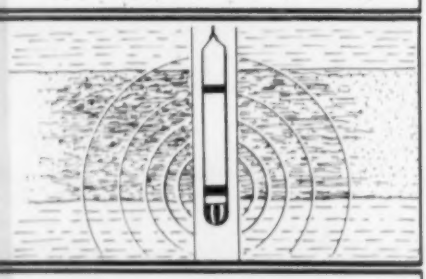
MUD CONTAMINATION OF PAY ZONES

FLUSHED-OUT CORES OBTAINED



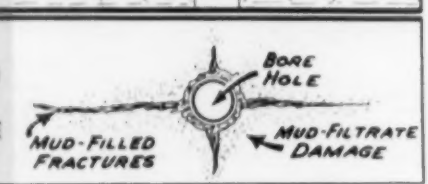
- ☐ Fresh or low-salinity water in core?
- ☐ Were cores highly permeable? Were they taken at great depth?

FILTRATE AFFECTED LOGS AND DST'S



- ☐ Resistivity curves of oil and water sections appear similar?
- ☐ Low S. P. deflection in permeable zones?
- ☐ Did drill-stem test make mud filtrate water?

LOST MUD IN PAY ZONE



- ☐ Was some mud circulation lost after pay zone was penetrated?
- ☐ Did pay zone produce mud?

CURE OR TREATMENT

Too many core losses . . . Coring the pay zone is a useful way to determine the production to be expected from a well. But improper functioning of the coring tools can give such poor core recovery that the formation appears unpromising.

In many pays the more productive sections are soft and may disintegrate when cored. Sometimes this soft rock will plug up the core barrel and further attempts to core drill will result in grinding away the formation without recovery.

Side-wall cores are useful in checking formations that have been drilled through or which were lost in coring. However, poor side-wall core recovery occurs when mud cake is thick or the formation is very hard. When these conditions exist, improve the recovery with special coring devices.

Drill-stem test produced mud or water . . . Drill-stem testing is an inexpensive way to determine the merits of setting an expensive casing string. But tests of mud or water may result from factors other than "dry" formations.

When the test recovers only mud, with or without oil or gas, it is possible that the packer failed. Since the mud column pressure is greater than the formation pressure, the mud in the annulus will seep around a leaking packer before the pay can give up any oil.

If water is produced, check your logs to see whether a water zone is open. In doubtful cases, run a straddle packer test on the most promising section.

Wrong type of logs run . . . Many factors determine what type of logs will give you the best indications of a pay zone. Mud type and resistivity, formation thickness, and type of formation must be considered.

Extremely low or high-resistivity muds may prevent any electric-log resolution. In these cases, you should run radioactivity logs to determine lithology and porosity. The Laterolog or Guard Electrode log is good for obtaining formation resistivity in low-resistivity mud while induction logs will give this information in high-resistivity mud.

Thickness of beds will considerably affect resistivity readings. Could the logs you ran show thin pay sections? Don't fail to consider running special logs designed for these problems.

You may have run all the logs necessary to find your pay zone. But did you use modern log-interpretation techniques? In limestone formations or shaly sands quantitative log analysis is frequently necessary to find the productive zones. Before you plug your well, have an expert examine the logs to find the pay you may have missed.

Drill-stem test not open long enough . . . Drill-stem tests are run to evaluate formations for production. Keep this in mind and you will make better tests. To determine the optimum length of time for a test, you should consider the possible contamination of the formation that may have occurred and leave the well open long enough to clean it up.

Flushed-out cores obtained . . . During drilling or coring of prospective oil pays with water-base mud, filtrate is lost to the bottom of the hole and the bore-hole wall. Filtration ahead of the bit may be very rapid since the bit prevents filter-cake accumulation.

A similar action occurs in the bore-hole wall above the bit. High-permeability formations or slow penetration of permeable formations enhance flooding of possible pays (thus side-wall cores may be altered).

Water flushing will not remove all oil in the cores, however, and "oil cut" or fluorescence may indicate the pay zone. If the water in the core is fresh, it is probable that mud filtrate flushed the core.

Don't let low oil content of cores make you pass up a pay zone. Use your logs to check oil content.

Filtrate affected logs and drill-stem tests . . . Some fluid is nearly always lost from the bore hole during drilling with mud. When the mud water loss is high or the zone has been exposed a long time, filtrate invasion can materially affect electric logs and drill-stem tests.

Resistivities of invaded oil and water sections of a zone will be nearly the same. Unless the radius of investigation of the logs can be extended considerably beyond the invaded zone, distinction of a pay zone is difficult. Increasing the electrode spacing will increase the radius of investigation but it would be better to limit the invasion by proper mud water-loss control.

Drill-stem tests that yield fresh or slightly saline water indicate an "invaded filtrate." If filtrate only is obtained on the test, run a longer test.

Water block or clay swelling can result in very little fluid during the test. A chemical wash will remove the water block and reduce clay swelling.

Lost mud in pay zone . . . When lost circulation occurs during drilling, the mud usually enters a permeable formation. Except in very coarse formations, such as gravel beds, the mud will not penetrate very far in the pores. However, in many formations the mud either flows into existing fractures or creates new fractures.

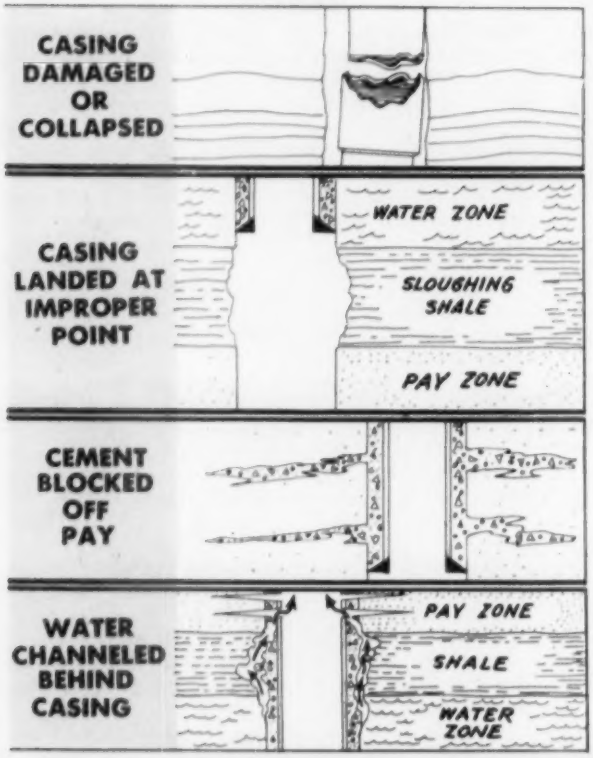
When mud blocks native fractures, it may destroy much of the well productivity, especially in vugular limestones. But mud which flows into new fractures may also block the formation by loss of filtrate.

If you are testing a zone where mud loss occurred, inject a chemical "wash" or mud acid into the formation to be sure you get a test. Don't cut the test short before the formation fluid can displace the mud and invaded water.

COMPLETION . . . .

RUNNING PIPE AND CEMENTING PROBLEMS

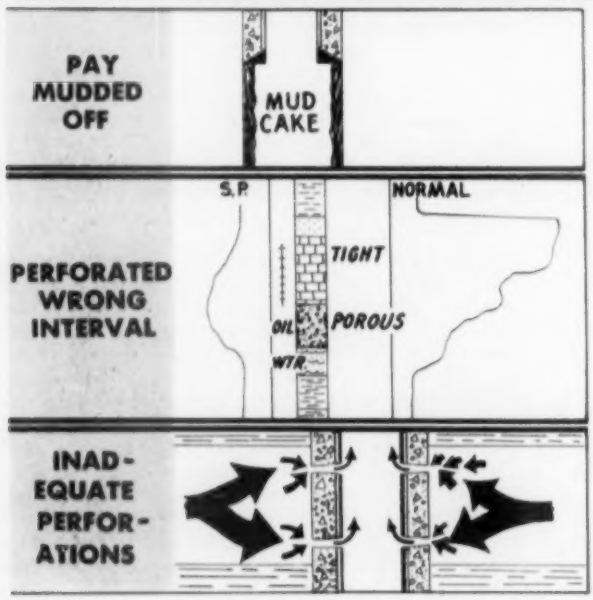
PROBLEM



DIAGNOSIS CHECKLIST

- ☐ Did you fail to keep casing in tension?
- ☐ Packer set too close to perforations during squeezing?
- ☐ Did you fail to make accurate hole and casing measurements?
- ☐ Were water or sloughing shale sections left open?
- ☐ Did poor hole conditions prevent casing from reaching total depth?
- ☐ Production less after casing was set than on open-hole drill-stem test?
- ☐ Was secondary squeezing performed in pay section?
- ☐ Did you fail to circulate cement past pay zone?
- ☐ Contaminated cement or poor consistency—didn't seal?

IMPROPER DRILLING-IN OR PERFORATING



- ☐ Formation pressure low? Mud on formation too long?
- ☐ Does pay have large pores, vugs or fractures?
- ☐ Was perforated zone impermeable?
- ☐ Were perforations too close to water zone?
- ☐ Was perforation depth correlated with formation log?
- ☐ Did perforations fail to penetrate casing and cement?
- ☐ Perforations plugged with mud or sand?

CURE OR TREATMENT

Casing damaged or collapsed . . . Casing strings are designed to withstand lateral and tensional stresses caused by cementing pressures and the weight of the pipe. But if a string is put into compression it may buckle. The result may be a bend which restricts passage of tools or, if at a joint, a thread can crack and the joint can collapse.

Always land your casing in tension. Don't set it down on bottom even momentarily or it may not pull back straight. It's a good idea to land the casing in the casing head at the same position in which it was hanging when the plug hit bottom.

When you squeeze-cement perforations, be sure the packer is not too close to the perforations. If the highly pressured cement channels up behind the packer, the stresses can collapse the casing.

Casing landed at improper point . . . Poor hole conditions or miscalculation of pipe length may keep the casing from reaching the desired depth. Exposed gas or water zones above or below the pay can cause a poor pay zone performance.

Exact measurement of hole and casing is needed for proper placement. The position of placement will depend on the method of completion and on what well data tell about the formations exposed. After casing is run, the collar positions with respect to the pay formation should be checked with a gamma ray-neutron log to insure best results in completion.

Cement "blocked off" pay . . . Cement may block off a pay zone in these ways: (1) form a sheath too thick to be perforated to the formation, and (2) lose water which may form a "water block" or may react with mud-filtrate water to produce a precipitate which blocks the pores.

Squeeze-cementing operations may cause more severe damage than primary cementing. In squeezing, the formation is fractured and cement is forced back against fresh formation surfaces. Normally, there is no mud cake to limit the loss of cement filtrate to the fracture walls and large volumes of water will be lost.

You can minimize cement blockage by obtaining a good primary cement seal. Use scratchers and centralizers if possible but be sure to circulate as large a cement volume as possible past a section to obtain a good seal.

Water channeled behind casing . . . Channeling of water through poorly cemented annular sections of cased wells can prevent a test of the pay. Even with the best cementing techniques mud cake is hard to remove from the permeable sections and mud stringers tend to stay in the annulus. These make good paths for water to get from one formation to another.

When you suspect water channeling, perforate and squeeze the sections above and below the pay as well as the pay perforations in order to fill the channels and isolate the pay zone. Squeezing only the pay zone may shut off the water but if water is not shut off the first time, repeated squeezing may damage the productivity of the formation.

Pay mudded off . . . Where formation pressures are low, you can eliminate mud damage by setting pipe above the pay zone and drilling in with oil, or cable tools. Or if formation pressures are higher than the head of a column of oil, you can use weighted oil-base muds or salt solutions to drill in with a minimum of damage. For water-sensitive sands, oil-base muds are the best.

Oil-base muds are expensive but can be weighted sufficiently to hold any formation pressure. Brine solutions are relatively inexpensive and have densities up to 12 lb. per gal.

When you case the pay zone, displace the mud from the perforation interval with oil, oil-base mud or brine before you perforate. You can eliminate even more of the mud damage to perforations by using the permanent-type well-completion technique.

Perforated wrong interval . . . A little thing like perforating a few feet off the correct pay depth may mean the loss of a producer. Perforation depth can be measured wrong but also the depth also can be incorrectly chosen. Use modern log-interpretation techniques to define pay boundaries and eliminate poor choices.

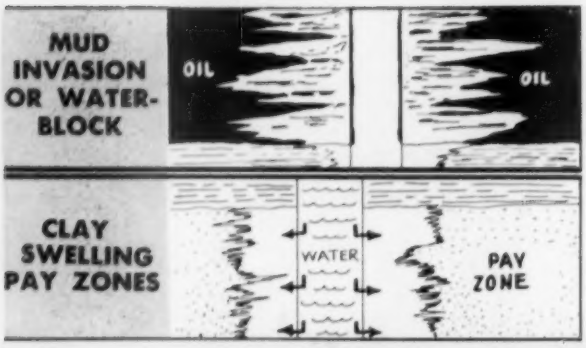
You should use the perforating line and instruments to check perforating depth. Run a gamma-ray log to match the perforated section with the electric-log-indicated pay. When logs don't match, give several feet of leeway in perforating when there is danger of penetrating the wrong zone.

Inadequate perforations . . . Normally there are not enough perforations to obtain the productivity that would be possible with an open hole. But two holes or more per foot will allow 50 per cent or more of the unrestricted flow (which is usually enough to obtain allowed production). If the holes are less dense the productivity falls off rapidly.

Merely shooting a lot of holes won't insure adequate perforations. Debris from the shot or mud cake may plug the perforations. Damage may occur with oil-base or water-base muds and with bullets or jets. To lessen damage to perforations, shoot large diameter holes. Don't limit your production test by shooting too few perforations. Consider that some of them can be plugged.

MUD-WATER FORMATION BLOCKS

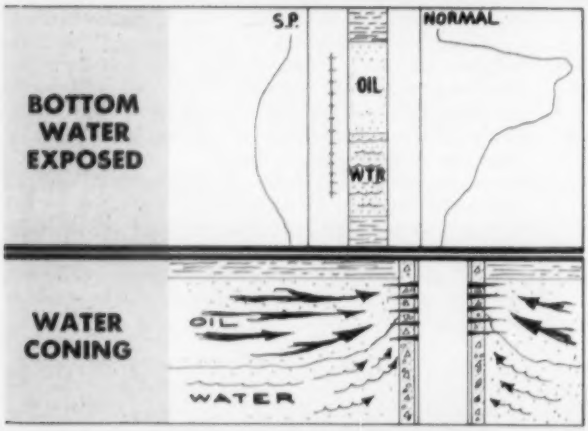
PROBLEM



DIAGNOSIS CHECKLIST

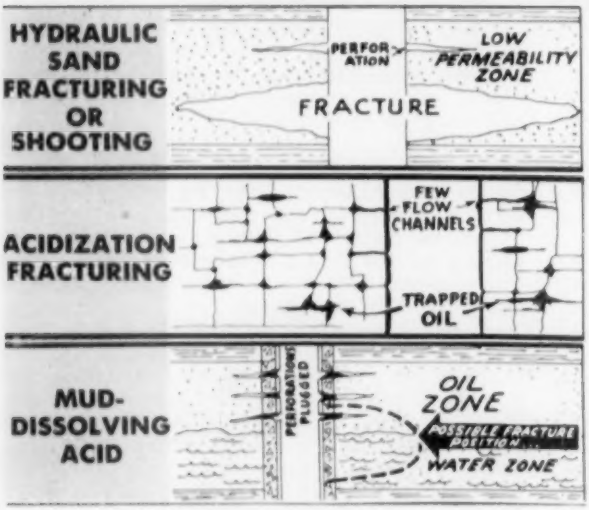
- ☐ Did well make only small amount of water or oil-water emulsion?
- ☐ Was only mud filtrate or wash water produced?
- ☐ Was there shaly material in pay-zone cores?
- ☐ Did cores show low permeability to mud-filtrate water?

POOR WATER SHUTOFF



- ☐ Did you fail to locate the oil-water contact?
- ☐ Were perforations inaccurately placed?
- ☐ Were fractures created from oil zone to water?
- ☐ No impermeable barrier between oil and water zones?
- ☐ High-pressure drawdown of well on test?

FORMATION STIMULATION NEEDED



- ☐ Are pay zones tight? Slow pressure buildup?
- ☐ Did mud or filtrate damage occur?
- ☐ Are pay formations mainly limestone or dolomite?
- ☐ Vugular porosity—low pressure and productivity?
- ☐ High-permeability pay zone but low productivity on test?
- ☐ Was mud lost through perforations into pay zone?

CURE OR TREATMENT

Mud invasion or "water block" . . . Invasion of water of any kind into an oil-bearing zone can prevent a good production test. In cases of severe invasion, several barrels of mud filtrate per foot of hole will enter the permeable section. When the zone is drilled-in or washed with salt water this volume can be even greater.

A water-block or occurrence of an oil-water emulsion in the formation may practically prevent production. Even after oil flow begins, the productivity may be very low because of water left in the formation.

Many methods have been developed to overcome water blocks and mud plugging. Some successful washing fluids contain acids which break up or dissolve mud particles and surface-active agents capable of reducing the interfacial tension between the water and the oil.

Clay swelling in pay zone . . . Clayey material exists in many permeable sands. As long as water does not contact this material it will not affect productivity. But when the clay is swelled by water, drastic permeability reduction of the sands will occur.

Acid or calcium chloride solutions will sometimes deswell the clays and increase sand permeability. However, these solutions can cause water-blocking unless they contain effective surface-active agents. You should also consider fracturing.

Bottom water exposed . . . When a potential pay zone makes water, you should carefully examine the completion technique. Check the water composition as well to be sure it is formation water. Channels behind the casing can connect pay and water zones. Or, if there is no formational barrier between oil and water, the perforations may be in the water zone.

Use log analysis to find the oil-water contact before perforating. Oil and water zones will show on the normal and lateral curves or if salty muds were used, Laterlogs or Guard Electrodes will show the zones.

You can inject cement slurry into the perforations under high pressure to shut off water. But to be sure the cement goes into the channels behind the casing, perforate above and below the pay.

Water coning . . . You can produce large amounts of water even though the water zone is not exposed.

Water coning occurs when the water-oil contact is relatively close to the perforations and there is a large pressure drop from the formation to the well. The vertical permeability of the formation will be high.

When the well is first opened, only the oil immediately around the well bore starts flowing. But as oil leaves, fluids farther out in the formation flow in.

The oil and water in the formation are under the same pressure and the water flows upward preferentially to oil that is farther away. Gravity tends to hold the water back.

When you reduce the pressure drop and the flow rate of the well, the coning may stop. But this may not solve the production problem because water will be left in the oil zone and will reduce the permeability to oil. You can reduce the drawdown and increase oil flow by drilling drain holes or shooting large projectiles into the oil zone.

Hydraulic sand fracturing or shooting . . . Oil-bearing pay formations of good porosity may be unproductive whenever permeability around the bore hole is low. By reducing this flow resistance you may bring in a paying oil producer. You can overcome low-permeability regions extending short distances from the well bore by perforating or chemical washes. But when these regions extend more than a few feet you should fracture the formation.

Pressure-buildup curves will determine if low permeability is localized around the hole or exists throughout the formation. Small fracturing treatments or shooting will eliminate local damage and give good results in high permeability sections. In low-permeability formations you can obtain best results by using large volume sand-fracturing treatments.

Acidization fracturing . . . Acidization of carbonate formations, when first used, dissolved only the formation around the hole. Most modern acidizing techniques, however, employ pressure injection and breakdown of the formation.

You should attempt to get a formation breakdown when you acidize. This results in fractures which can conduct fluid into the bore hole from out in the formation. Fractures are preserved by etching of the acid.

Acidizing carbonate formations may not increase productivity if residue is left when the rock dissolves. In formations where this occurs, frequently acid-sand fracturing is more effective because the sand props open larger channels. The acid etches the fracture walls and helps to open pores which are not connected to other flow channels.

Mud-dissolving acid . . . Mud-plugged perforations must usually be washed out before the formation can flow or the well can be stimulated. Hydrofluoric acid mixtures are quite effective in dissolving mud cake and cleaning up perforations and the formation face.

When there is a chance of creating channels to a water zone use mud-dissolving acid washes in preference to fracturing. Don't use high pressure in placing the acid in this case because the acid may also fracture the formation to water.

L.A. REFINERS MOVE IN ON SMOG

Problem is being attacked on three fronts: (1) control of hydrocarbon evaporation, (2) curbing of smoke and dust, (3) recovery of sulfur compounds from waste gases

by D. H. Stormont
District Editor

LOS ANGELES' smog problem shows little sign of being eased in the near future. But the lack of progress is not due to inactivity on the part of refiners in that area.

Continually ahead of regulations imposed by air-pollution-control authorities, Los Angeles refiners have cut their contributions by about 50 per cent. It has cost them about $25,000,000 for control equipment, plus an additional $2,500,000 for research.

Sources of pollutants which result in the formation of smog, and the eye irritation which goes hand in hand with a severe attack, have not been definitely pin-pointed. Organic compounds and oxides of nitrogen head the list of suspects. Hydrocarbon vapors have been particularly suspect.

The automobile, with its estimated 1,200-ton-daily output of hydrocarbons, today is the largest contributor to smog, in the opinion of pollution control officials.

Total hydrocarbon losses from the oil industry's producing, refining, and marketing activities in the Los Angeles area are about 228 tons daily, according to oil-industry studies. These current losses compare with an estimate of 450 to 500 tons daily being lost before the new control measures were adopted.

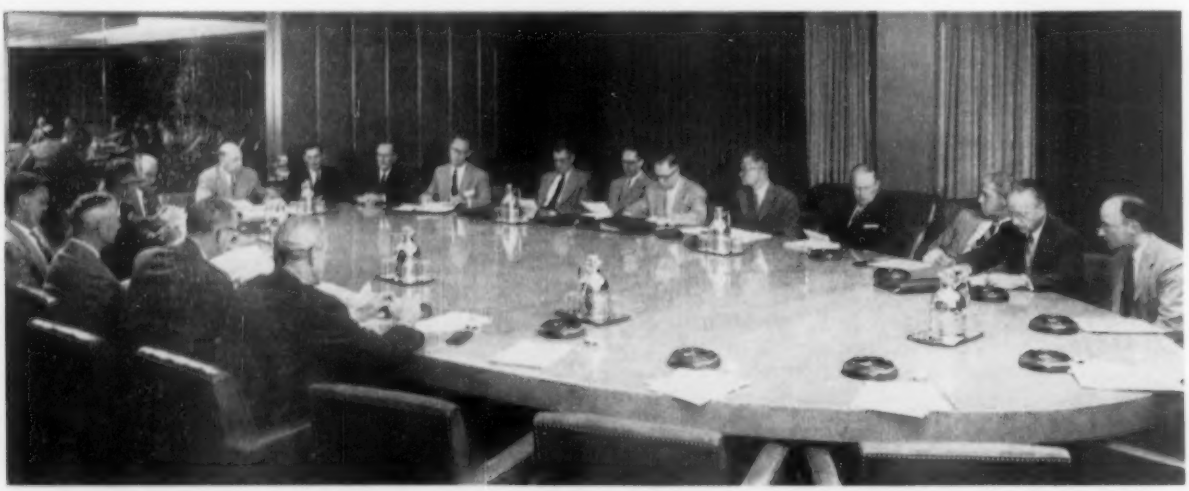
Surveys made by the Western Oil and Gas Association's air-pollution control committee in March 1953 and March 1955 indicated that losses from refineries owned by association members were 251 and 95 tons daily, respectively. Corresponding losses incurred in distribution activities at these two dates were 90 and 26 tons daily, respectively.

These hydrocarbon losses were those of companies which operate 91 per cent of the refinery capacity in the Los Angeles area. They do not include those of numerous small refineries. A study made by Southwest Research Institute in 1954 placed losses from small refiners at 19 tons daily.

In addition to the hydrocarbon losses from its refining and distribution activities, the association's survey in March 1954 estimated those from producing activities to be 30 tons daily. Service-station losses were estimated at 44 tons daily in November 1953, and at 56 tons daily in May of this year.

Control methods used . . . Refiners have attacked the air-pollution problem on three fronts: (1) control of hydrocarbon evaporation, (2) curbing of smoke and dust, and (3) recovery of sulfur compounds from waste gases. Of these only the control of hydrocarbon evaporation appears to be important from the standpoint of eye irritation and crop damage.

In addition to these major undertakings, which are discussed in detail under their separate headings, several changes in operating methods have been made. For one thing, most large plants



AIR POLLUTION CONTROL COMMITTEE of Western Oil and Gas Association, and guests. Clockwise: Felix Chappellet, vice president and general manager, Western Oil and Gas Association; David E. Day, Richfield Oil Corp.; T. O. Edwards, Tide Water Associated Oil Co.; L. O. Hossom, Hancock Oil Co.; Alexander Macdonald, Macdonald & Halsted; Kenneth E. Kingman, vice president, Union Oil Co.; Bernard O'Connor, The Texas Co.; P. S. Magruder, General Petroleum Corp.; Jerry Luboviski, Union Oil Co. of California; Don B. O'Neill, Independent Refiners Association of California (deceased); P. J. Merkus, Shell Oil Co.; William H. Claussen, A.P.I.; George W. Stroebe, California Research Corp.; Gerald Fisher, General Petroleum Corp.; Fred Powell, Standard Oil Co. of California; Thomas Simpson, General Petroleum Corp.; Jack Sembower, Shell Oil Co.; C. A. Day, Richfield Oil Corp.; and Don Sweeney, W.O.G.A.

now use only natural gas or refinery gas as fuel. Only when supplies of natural gas are interrupted during cold days do they switch to standby fuel oil.

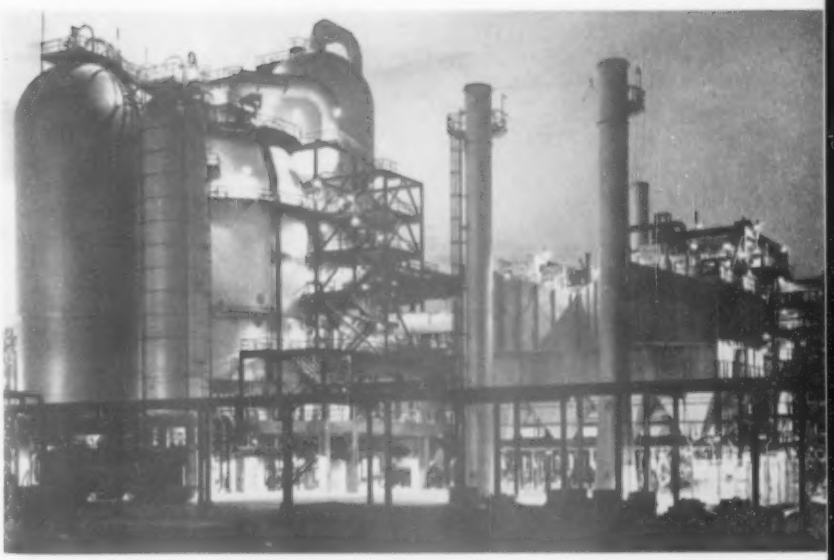
Still another example of cooperation is the voluntary plan of nine refineries represented by the Western Oil and Gas Association for curtailing their activities during smog alerts. On the first alert the refiners will check all control equipment, cease burning of waste materials, and urge employes to refrain from automobile driving and other smog-producing activities.

If a second alert is called, cleaning of tanks and repair of equipment is stopped, sampling and testing activities are curtailed, and loading of petroleum products is halted at all racks not equipped with vapor-recovery devices. Units shut down for repair and inspection are to remain shut down.

Public better informed . . . Despite the industry's efforts, the general public all too often has placed excessive blame at the refiners' doorstep. Likewise there has been a tendency for some civic authorities to sometimes disregard facts compiled by air-pollution-control authorities.

The extent to which some smog-plagued citizens would go include demands that all refineries be moved out of the Los Angeles area. Others would shut down all catalytic cracking units; burning of motor fuels containing catalytic cracked gasolines would be outlawed.

Until quite recently, the oil industry has been prone to let such suggestions, and statements by civic officials, go unanswered. Partially for this reason, the degree of blame placed on refining activities varies from zero to 100 per cent in the opinion of the public.



AIR-POLLUTION-CONTROL EQUIPMENT accounted for about half the cost of this new fluid catalytic cracking unit of Richfield Oil Corp. at Watson. About 2 million dollars of the 4 million total expenditure was earmarked for this purpose. Over $500,000 went for the electrostatic precipitator shown in the foreground.

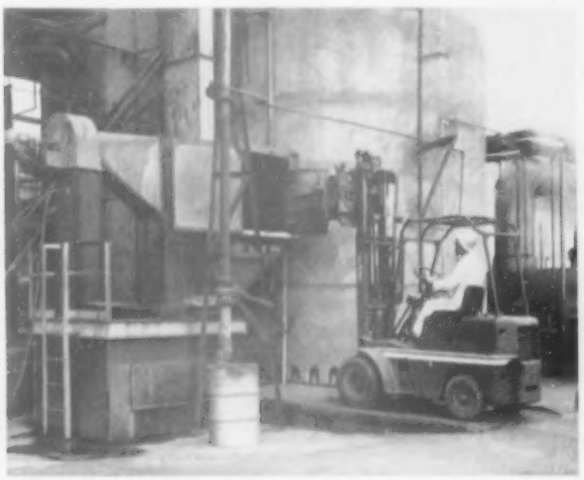
Progress now is being made on this front. Primarily due to the association's public-relations efforts, the public is being made more familiar with the facts: that the oil industry may be a contributor to the smog problems, but its share is quite small when compared with those of the general public in its use of automobiles and backyard burning.

1. Control of Hydrocarbon Vapor

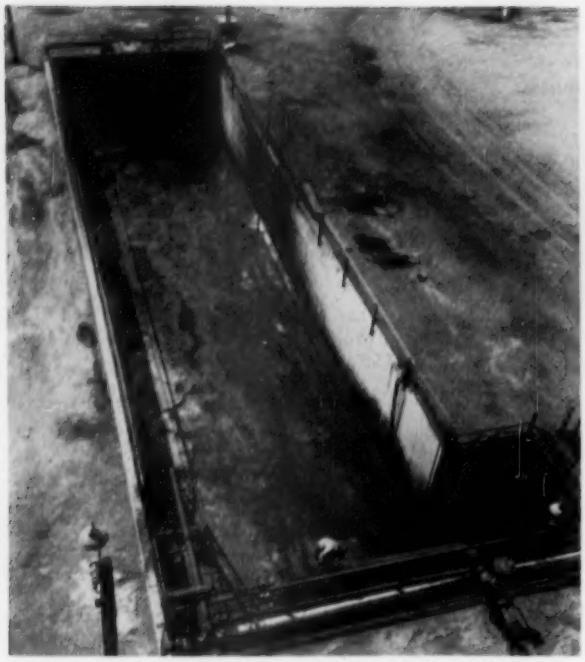
The reduction in hydrocarbon vapor losses has been achieved by: (1) controlling evaporation losses at storage tanks; (2) installing recovery equipment at truck-loading racks; and (3) reducing evaporation losses from separators and sewers. Other steps taken, largely associated with preventive maintenance, are discussed after these topics are covered.

Net result of the oil companies' efforts in checking hydrocarbon losses from their refining and distribution activities is reflected in the accompanying table. As stated earlier, the Western Oil and Gas Association surveys show work at refineries caused a 156-ton drop in daily emissions during the 2-year period ending last March. Dis-

THREE-STAGE CYCLONES at Richfield's fluid catalytic cracking unit prevent loss of catalyst fines to the atmosphere. Flue gas and catalyst fines go to a CO waste-heat boiler and finally to the electrostatic precipitator.



DUST LOSSES ARE MINIMIZED at General Petroleum's Torrance refinery by using this method of adding catalyst to the T.C.C. units. Any dust resulting from the dumping of the barrel is collected in the vacuum-equipped hopper.



OIL-WATER SEPARATION at General Petroleum's refinery is carried out in a concrete-covered pit, top of which is shown here. Conventional vapor-recovery equipment collects all vapors.

FLOATING-ROOF TANKS help to minimize hydrocarbon losses to the atmosphere in Shell's Wilmington and Dominguez refineries. Some 47 tanks have been so equipped at the two plants.

tribution losses were cut 34 tons daily during this period. As is also shown in the table, Southwest Research Institute's March 1954 check of the association's figures differed by only some 12 per cent.

Miscellaneous refinery losses were reduced from about 79 tons to 19 tons daily in the 2-year period. Pumping-gland leakage, estimated at 7 tons daily, is the largest factor involved.

Installation of equipment to reduce vapor losses from storage tanks was undertaken when studies indicated that light hydrocarbons probably were a contributing factor to the smog problem. Gasoline tanks drew first attention. All stored products having a vapor pressure of 1½ psia. or greater eventually became involved, however.

After spending about $5,000,000, the industry has greatly reduced this source of pollutants. Losses are estimated to have been reduced from 75 tons of hydrocarbons to only 28 tons daily. The program in general was uneconomical. In addition to this work on light-product storage, losses from crude-oil storage tanks have been cut from 30 to 15 tons daily.

When control of storage-tank losses became linked with the smog problem, the various refiners were in widely varying positions. Several major companies were already equipped with extensive vapor-recovery systems dating back to 1930 or earlier. Quite a number of floating-roof tanks were in service. There also were many cone-roof tanks with no means of recovery.

As the problem was recognized, refiners generally moved in the direction of extending vapor-recovery systems, using floating roofs on new tanks, and replacing cone roofs with floating roofs.

HYDROCARBON LOSSES INCURRED IN REFINING AND DISTRIBUTION ACTIVITIES OF NINE COMPANIES REPORTING TO WESTERN OIL AND GAS ASSOCIATION*

	March 1953	Nov. 1953	March 1954 W.O.G.A.	March 1954 S.R.I. audit	March 1955
Refinery losses:					
Catalytic cracking	16.9	16.9	17.5	21.3	19.4
Separator and sewers	42.5	40.4	13.6	15.7	8.9
Storage—crude oil	25.8	29.6	26.9	31.0	15.3
Storage—gasoline	75.3	71.0	51.3	44.4	27.7
Treating	4.3	2.3	4.0		5.0
Vacuum jets	7.0	7.0	7.0	0	0
Miscellaneous	79.1	45.0	25.5	54.2	18.9
Total	251.0	212.0	145.8	166.6	95.2
Distribution:					
Filling trucks at refineries	12.9		8.0	11.2	4.3
Filling trucks at bulk plants	12.2		12.7	10.2	10.3
Filling railroad cars	1.5		0.6	0.7	0.6
Filling tankers	†17.4		5.7	5.6	5.8
Filling and breathing—bulk terminals	15.8		7.4	4.4	4.7
Filling and breathing—marine terminals				‡7.4	
Total	59.8		34.4	39.5	25.7

*Companies reporting amount for 91.4 per cent of refining capacity in the Los Angeles area. †Assumed loss of 0.15 per cent which was later found to average 0.05 per cent by tests. ‡Included in gasoline storage by W.O.G.A.

Rule passed . . . Then in April 1953, the County Board of Supervisors passed Rule 56. This required that all tanks above 40,000-gal. capacity containing petroleum products having a vapor pressure of 1.5 psia. be equipped to eliminate losses of vapors to the atmosphere.

At the time the rule was passed, most tanks already were in compliance. Total industry figures are not available, but those for nine companies having 91.4 per cent of the Los Angeles County refinery capacity were as follows:

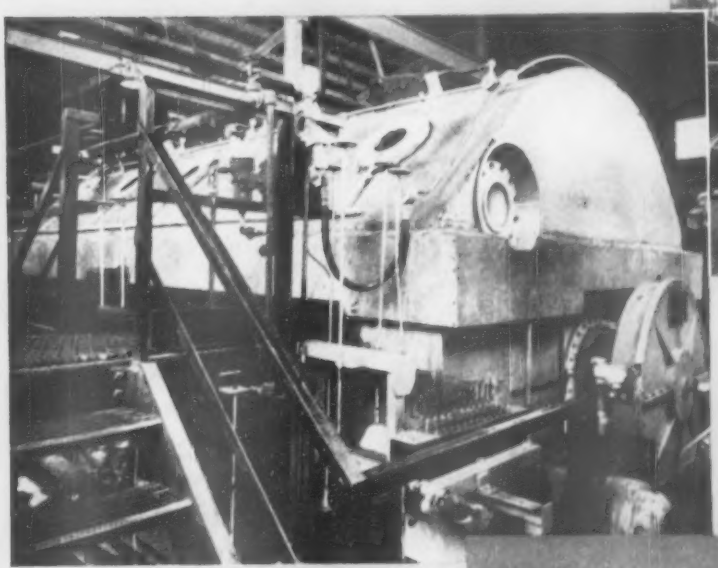
MODERN REFINERY EQUIPMENT

pays dividends . . .

. . . in greater production, higher quality, less maintenance cost and less down time due to failure. CB&I, a pioneer in the manufacture of welded steel plate structures for the petroleum industry, design, engineer, fabricate and erect such structures as Hortonspheres®, Hortonspheroids®, processing towers, and Conkey filters . . . modern refinery structures built to exacting specifications. When you plan welded steel plate structures for your refinery be sure to write our nearest office for information, estimates or quotations.

FLUID CAT CRACKER

CB&I built the reactor-regenerator and catalyst hoppers for the UOP fluid catalyst cracking unit shown above at the Rock Island Refinery Corp., Zionsville, Indiana, refinery.



CONKEY SOLVENT DEWAXING FILTERS

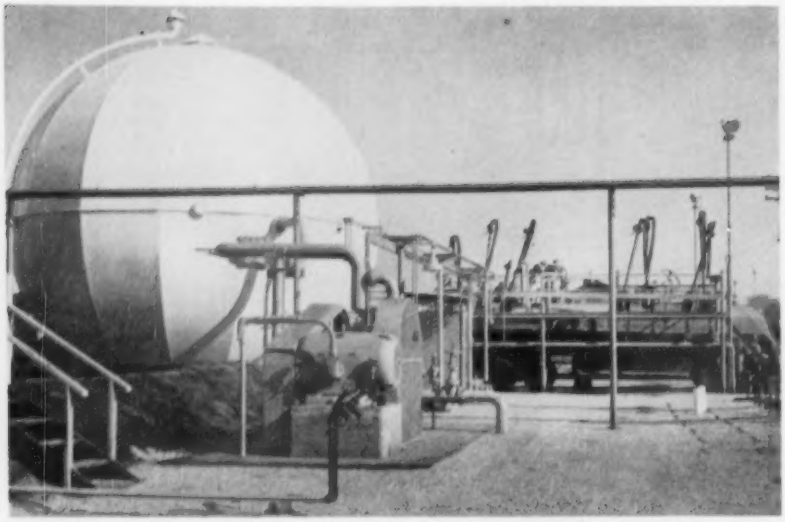
These filters are specifically designed for the clarification filtration of oil solvent mixes for the recovery of slack wax in refinery MEK solvent dewaxing plants. They are also applicable to product wax recovery from recrystallization filtration of slack wax with concurrent removal of product wax and soft waxes from low cold test oils.

CB&I

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa • Washington

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.



VAPOR-RECOVERY SYSTEM is in operation at Shell's Wilmington refinery tank-truck loading rack. Vapors are collected in the white spherical tank and fed into the refinery fuel system by the compressor in the foreground.

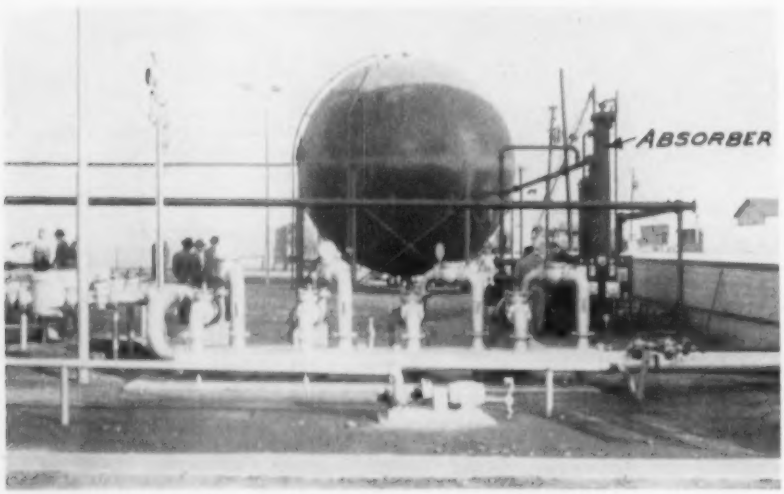
	No. of tanks	Per cent	Capacity (bbl.)	Per cent
In compliance	421	66	20,262,000	75.6
Not in compliance	218	34	6,522,000	24.4

Those not in compliance were, to a large extent, smaller tanks where vapor recovery was unattractive on an economic basis. Despite unfavorable economics, the industry did not in any way oppose passage of Rule 56. All tanks were brought into compliance some 6 months before the May 1, 1955, deadline.

Floating-roof units . . . Installation of floating roofs was the most common method employed. This was due to many of the tanks in small, isolated groups not well adapted to vapor-recovery installations. In some cases, vapor-balance systems were installed on sizable groups of large tanks where the turnover was relatively slow. In cases where vapor-recovery systems were already in existence, small tanks were connected into the system. Complete vapor-recovery systems were installed by several of the 13 small refineries in the county.

Based on data supplied by the nine large companies, total capital expenditures for the program were $5,050,000. Installation of the new facilities resulted in an estimated total gasoline recovery of 532 bbl. daily. With gasoline valued at 10 cents per gallon, a payout time of 10 years is indicated.

While not attractive, the anticipated payout is somewhat better than might be expected when consideration is given to the status of vapor recovery at the time the rule became effective.



VAPOR-RECOVERY SYSTEM at Standard Oil Co. of California refinery loading rack feeds a 10,000-cu. ft. gas holder. After compression, the vapors are contacted with regular-grade gasoline in the small absorber.

Truck-Loading Losses

Steps to reduce the amount of gasoline vapors lost to the atmosphere during tank-truck loading activities at refineries and bulk terminals is one of the industry's newest efforts.

In March 1954, losses of hydrocarbons to the air resulting from these operations were placed at 20.5 tons daily. They consisted of 8.0 tons from refinery racks and 12.7 tons at bulk terminals.

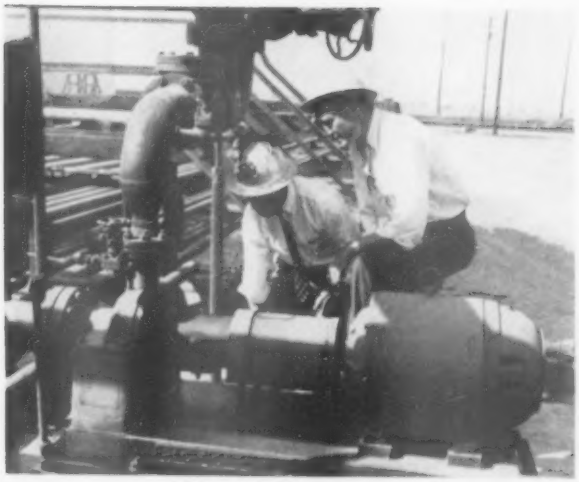
Though no regulations had been passed by the Air Pollution Control District—and the amounts were insignificant when compared with the estimated 1,200 tons released daily by automobiles—the industry last year voluntarily started correcting the situation. By last March losses had been reduced to approximately 15 tons daily.

The industry's goal was to have the 18 large and 74 smaller racks in the Los Angeles area equipped with vapor-recovery devices by last May. Slowness on the part of pollution-control authorities in issuing construction permits, and in granting temporary operating permits for racks equipped with experimental recovery equipment, has tended to delay the program.

Because of lack of knowledge concerning design and engineering problems involved, General Petroleum Corp. and Standard Oil Co. of California decided to take the lead. By late last year the former had installed experimental recovery equipment at its Torrance refinery and Vernon marketing terminal rack and Standard had equipped its Clearwater bulk-station rack. The devices recovered about 90 per cent of the vapors formerly lost to the atmosphere.

Vapor-recovery equipment has since been installed at a few other racks. But because of A.P.C.D.'s indecision as to what standards will be acceptable—temporary permits for the three experimental racks were not issued until just recently—the program for the most part has lagged.

Standard's installation, in brief, consists of equipment for collecting vapors from the manhole of the tank truck when filling, and piping vapors to a 27-ft.-diameter, 10,000-cu. ft. gas holder. The vapors are drawn from the gas holder by means of a compressor and compressed to 200 psig. From the compressor, these vapors are piped to an absorber and contacted with regular gasoline circulated from a large storage tank. Approximately 90 per cent of the hydrocarbon vapors are recovered.



CHECKING MECHANICAL SEALS on centrifugal pumps is routine maintenance in all Los Angeles-area refineries. Control of packing leaks has resulted in a bill of more than $500,000.

UNION OIL'S TRUCK-LOADING RACK near Rosecrans employs a vapor-takeoff arrangement which does not use a hood. Trucks are loaded entirely by meter except for topping off.

The General Petroleum installations are similar in design. However, the vapors are compressed at approximately 6 psig. at Vernon and burned as fuel under the steam boilers. At Torrance they are compressed to approximately 50 psig. and delivered into the refinery fuel system. Automatic compressor operation, with a sufficient range of capacity to cover all present and future conditions of filling, is provided at each rack as explained later.

This company has developed a loading hood through which the marker in the tank truck can be observed. The hood is approximately 10½ in. in diameter and 12 in. long, and is made of plexiglas or lucite.

Extending through the plate at the top of the hood is a 3-in. fill line which carries the gasoline to the bottom of the tank truck. The hood is adjustable up and down on the fill pipe.

The vapor space from around the fill pipe is connected through a 1½-in. quick-opening valve to the vapor header. This in turn is connected through a pressure controller to the suction of the compressors. The 2½-in. valve was linked to the gasoline-filling valve so as to open and close simultaneously.

At the bottom of the hood, a 30° cone tapered fitting, covered with neoprene Hycar rubber and suitable adapters, allow these filling arrangements to be used on various-sized manholes of from 6 to 15 in.

As at the other test racks, a scissor-arm-type mid-section loading assembly is used. An air-operated piston lowers the loading arm and keeps the tapered plug firmly seated in the manhole. As the filling operation can be observed through the hood, trucks are completely loaded before the plug is unseated.

Facilities installed by Union Oil Co. this year at its Roscrans bulk plant include a vapor-takeoff arrangement which does not use a hood. Tank trucks are loaded entirely by meter except for topping off.

Vapor Losses from Separators

Control of hydrocarbon losses from refinery skimming ponds, separators, sumps, and sewers is the current interest center in the air-pollution-control program. Uncontrolled, they were estimated to be the source of some 40 tons of hydrocarbon vapors daily. Corrective measures already completed have cut this source to about 10 tons daily.

The Air Pollution Control District, however, was not satisfied with the industry's voluntary efforts. Its evaluation of the work carried out was that while some installations have reduced losses by 95 per cent, others have had virtually no effect.

Accordingly, A.P.C.D. in October adopted a new rule (59), to become effective July 1, 1956, pertaining to skimming ponds and separators. The regulations require that oil-water separators be equipped with either: (1) a floating roof, (2) a vapor-recovery system, (3) a cover totally enclosing the liquids, or (4) other equipment of equal efficiency.

It has been estimated by A.P.C.D. that between $500,000 and $1,500,000 will be spent in bringing all refinery separators into compliance. Net effect of the rule, insofar as the major companies are concerned, will be to reduce losses from about 10 tons to 7 tons daily. The rule does not apply to oil and water separators and skimming ponds in producing operations.

Corrective methods . . . For air-pollution-control purposes, separators handling oil and water from closed refinery-drainage systems can be compared with tankage. The types of vapor emissions to be considered are filling losses, breathing losses, and effusion or weathering losses.

Separators, however, are usually dissimilar to tankage with respect to filling and breathing losses for the following reasons: (1) separators for the most part operate at a constant liquid level, precluding any filling loss; and (2) the relatively large volume of nearly constant-temperature process water flowing through a separator usually keeps the vapor space at a uniform temperature, eliminating breathing losses.

Tests indicate that under certain conditions there can be appreciable hydrocarbon losses from separators due to effusion. These conditions are: (1) no closure or only partial closure over the liquid surface of the separator; (2) volatile high-gravity oil on the surface of the liquid; and (3) a current of air moving over the surface.

The effusion problem usually can be controlled by installation of a vapor-tight closure over the top of the separator. This eliminates the movement of air, which some refinery engineers believe is the most important factor.

Covered skimmers . . . In some installations, all skimming sections are covered. In others, only the first section is enclosed. This is done in the belief that some 90 per cent of the oil is removed in this section; there is no need for enclosing the remainder of the separator. Some engineers claim that placing of loose boards over the pits sufficiently eliminates air circulation and, therefore, is all that is needed

AT THE PEP IN YOUR MOTOR FUEL

ADDING WARREN NATURAL GASOLINE TO YOUR PRESENT HIGH QUALITY MOTOR FUEL WILL GIVE IT THE

RETAINED VOLATILITY

SO NECESSARY FOR SUPERIOR PERFORMANCE... IN ANY SEASON

Warren's production, transportation, storage and service are your assurance of the quality and quantity of NATURAL GASOLINE you need . . . when and where you want it.

WARREN

PETROLEUM CORPORATION

TULSA, OKLAHOMA • Cable Addresses: STAVOLENE, WARREN

EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, (HOUSTON) TEXAS; SAN PEDRO, CALIF.

to bring vapor losses to a reasonable level.

At other plants, a system of floating-roof tankage is used for the skimming operation, followed by flotation-type clarifiers. The latter are equipped with vapor-recovery facilities for removal of air injected into the system for flotation purposes.

At two refineries concrete-slab-covered separators are used. A vacuum is maintained on the pit by means of conventional vapor-recovery equipment. The skimmed raw water is pumped to a surge tank, also equipped for vapor recovery, from which it goes to a chemical treating plant (*The Oil and Gas Journal, March 29, 1954, page 86*).

Liquid-sealed or tight surface-to-surface access and gaging hatches are provided to avoid vapor losses from these sources. Also, tank-type breather valves are provided for mishap protection.

Vapors at one plant are run to a compressor in a nearby dehydrator plant. Their recovery, plus better skimming of oil than was being effected in the old facilities, is expected to result in a long-term payout of the more than $200,000 installation.

2. Control of Catalyst Fines

Another phase of air-pollution control has been the steps taken to reduce losses of catalyst fines to the atmosphere.

Catalytic cracking units operating in Los Angeles County must control catalyst losses from regenerator stacks so as not to exceed the legal limit of 40 lb. per hour, as established by Rule 54 of the County Air Pollution Control District. In some cases, this amounts to cleaning the air; flue gases actually contain less dust than was present in the fresh air taken into the unit.

To meet these requirements, all refiners operating fluid catalytic cracking plants have installed precipitators downstream from two or three stages of cyclones in the top of the regenerator. A typical installation is shown in the accompanying diagram. One installation includes a carbon monoxide waste-heat boiler before the precipitator.

Thermofor catalytic cracking units do not present the problems found at the plants using fluid catalysts. The latter circulate the finely divided catalyst at a rate of 25 to 60 tons per minute, whereas the T.C.C. units use a bead or pellet form at rates of 150 to 200 tons per hour.

Regeneration . . . In regenerating fluid catalyst, air serves as the carrier as well as providing the oxygen for burning coke from the catalyst. The flue gases leaving the regenerator catalyst bed and rising up to the cyclones contain entrained catalyst. Some of these particles settle out of the rising gases in the space between the top of the bed and the inlet to the cyclones.

The disengaging space and the tolerable dust load of the precipitator are the two most important factors in the design arrangement of the cyclones in the regenerator.

Cyclones may differ in design, but all operate on the basic principle of imparting a swirling motion to the flue gases. This causes the entrained catalyst to be thrown to the outside of the cyclone and dropped into conical hoppers at the bottom of the units. A typical installation of cyclones is shown in an accompanying photograph.

As cyclone efficiency drops with decrease in catalyst particle size, there is an economic limit to the number of stages used for selective catalyst-size recovery. To meet the legal requirements of 40 lb. per hour requires that a precipitator be used downstream of the regenerator.

Precipitators used . . . The hot flue gases and catalyst dust from the regenerator pass through some type of heat exchange before entering the precipitator. Various types are used, but all electrostatic precipitators are designed to operate at high voltage and relatively small currents.

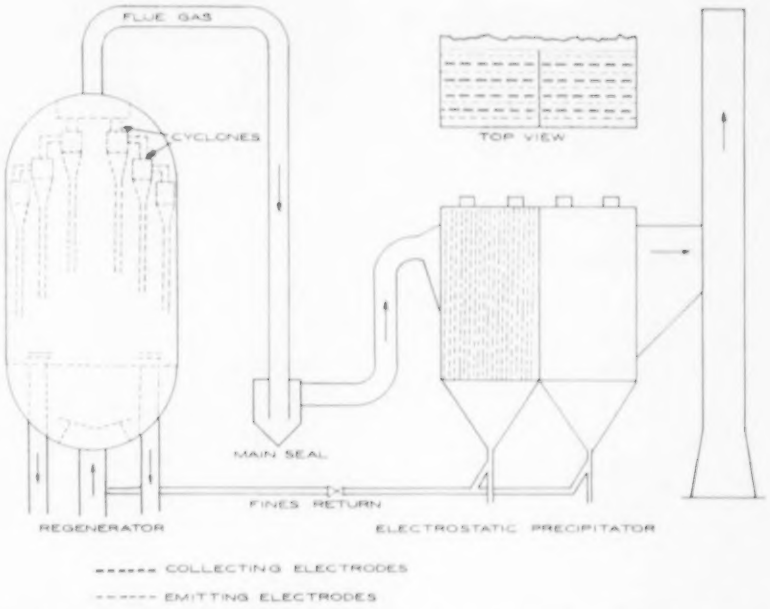
Due to the high voltage, catalyst particles in the flue gases are given a negative charge and are attracted to grounded collecting electrodes. To insure the most efficient precipitation of the dust, the flue gases are conditioned with steam before entering the precipitator.

The collecting electrodes are long plates set parallel with the emitting electrodes, which are a series of fine spiral coils. The catalyst collected has a natural tendency to fall into the catalyst hoppers at the bottom of the precipitator due to normal forces of gravity. This tendency is aided by rapping each panel of collectors. The emitting frames are also provided with rappers. Optimum rapping cycle is determined from actual operation of the unit.

Catalyst collected in the precipitator hoppers is dumped into covered tanks and hauled away for disposal. Some catalyst may be preferentially returned to the regenerator. However, the concentration of fines in the hopper material only results in their being rapidly carried back to the cyclones. In order to comply with the legal requirement, therefore, practically all catalyst collected in the precipitator hoppers must be discarded from the system.

Richfield Oil Corp., at its Watson refinery, makes use of a carbon monoxide waste-heat boiler in its dust-collecting installation. The flue gas and catalyst from the regenerator go to this boiler, where superheated 600-psig. steam is produced. This steam is generated from the sensible heat of the flue gases, from heat evolved in the combustion of CO to CO_2, and from combustion of fuel gas in the boiler.

Exiting gases from the boiler flow through an economizer where they give up their heat to the boiler feed water. They then flow to an electrostatic precipitator where a potential of 60,000



TYPICAL CATALYST-RECOVERY SYSTEM in use at Los Angeles area refineries which use fluid catalytic cracking.

volts is applied across the electrodes. In this case, ammonia in addition to steam is added to the flue-gas-catalyst stream to enhance the dust particles' susceptibility to electric charges.

Another installation includes a bank of cyclones following the precipitator. This was found necessary to comply with the legal limit of dust emissions.

3. Waste Gases

The use of flares at Los Angeles refineries is designed to provide emergency elimination of any excess gases by smokeless burning.

It is not a convenient method for the disposal of waste or off gases, but they must be operated so as to comply with County Air Pollution regulations. No flare may legally burn with smoke as dark or darker in shade as that designated as No. 2 on the Ringelmann chart (U. S. Bureau of Mines) for a period or periods aggregating more than 3 minutes in any hour.

Fuel-gas lines, blowdown lines, and all relief valves are usually tied in to a flare system. Its function is strictly to keep other hydrocarbons from escaping to the air due to the mechanical failure of other hydrocarbon control devices.

Flare stacks are usually 125 ft. or more above grade and are placed at considerable distances from refinery units for safety reasons. As shown in the accompanying diagram, gases to the flare pass first through a knockout drum for removal of residual hydrocarbons. Then they go to a water-seal pot to prevent back-travel of air into the system with a resultant explosion hazard.

The gas to the flare passes a pressure-sensitive controller which actuates the steam valves to allow the proper amount of steam to the flare-head steam jets. This steam acts as a suppressor to smoking of the flare. Below the flare head flame arrestors are located to prevent flame from traveling down the stack. The flares are generally fed a small amount of gas continuously to prevent the breathing in of air.

If a flare is designed for smokeless operation, good practice calls for a strainer in the steam line at the base of the stack or as near to the steam ring as possible. A strainer is also recommended for the pilot-gas line. Most flares are the John Zink type. Only a few are company designed.

Miscellaneous Losses

Air-pollution control, in addition to the several major methods already discussed, is also being voluntarily effected in numerous other ways. These involve changes in facilities and operating methods, preventive maintenance, and vigilant inspection.

An example of this work is loss which can result from spillage of volatile liquids to the atmosphere, ground, or to concrete drainage slabs emptying into closed drainage systems. Such spillage can occur when lines are opened for blinding, or where leaks develop in lines or vessels.

Tests have indicated as much as 50 per cent vaporization loss when gasoline is spilled on a concrete drain slab. That from spillage of gasoline to the ground, or of L.P.G. to the atmosphere, can be assumed to be 100 per cent.

This type of emission is being controlled through preventive maintenance of lines and vessels for leakage control, and the use of tight piping and valving arrangements to eliminate the necessities of blinding. Examples of the latter are the segregation of lines into single-service operation, use of the double block and bleeder, and use of a reliable type of twin-seal valve.

Pumping packing losses . . . Another field of control has been to reduce leaks from pump packing glands. Almost all centrifugal pumps engaged in light-product service now have been equipped either with mechanical seals or pressure-lubricated packing.

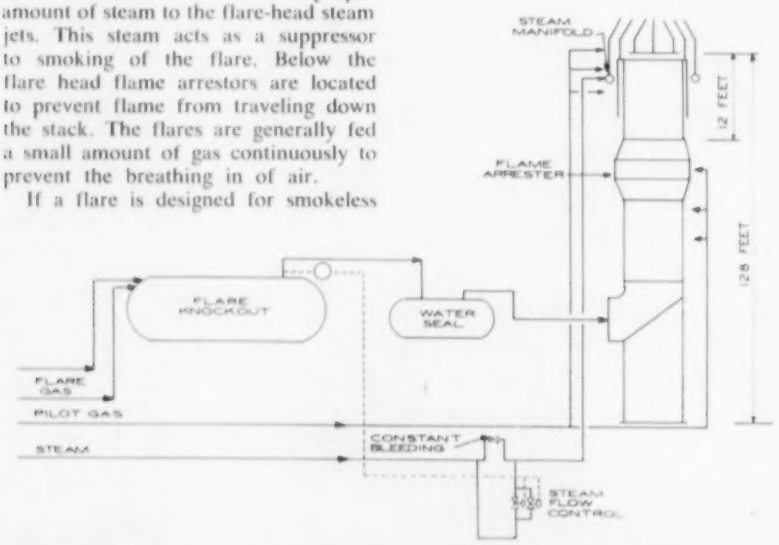
Centrifugal pumps, used much more extensively than reciprocating pumps in refineries, can develop extensive losses through failure of packing around the pump shaft. In pumping lighter fractions, it is necessary to increase operating pressure exerted by the stuffing box. Under these conditions, packing pressures and losses increase and lubrication becomes poorer.

Lubrication can be improved and leakage reduced by installing a lantern ring in the middle of the packing and introducing oil through the wall of the stuffing box into the lantern ring. Sufficient oil pressure is maintained to just offset the pressure inside the pump. This method has been used extensively.

Mechanical seals, however, have been used in most plants. This seal consists of two rings running against each other, one sealed to the pump housing and the other to the shaft. As the rubbing surfaces flatten, this results in a large area of perfect contact when the seal is properly adjusted. Chief criticism has been that when a seal fails, hydrocarbon losses can be substantial.

A method used to evaluate packing efficiency is to wrap the stuffing box and adjacent pump housing with a strip of canvas or plastic cloth. The covering is either glued or clamped to the housing to minimize leakage to the air. A laboratory vacuum pump then takes suction from the enclosed space and discharges a metered volume of gas. Analyses of vapors allows the rate of actual hydrocarbon loss to be calculated.

An idea of the cost of equipping pumps with mechanical seals can be gained from Standard of California's experiences at its El Segundo refinery. At a cost of $90,000, most of the old pumps, 130 of them, have been so equipped. All new pumps contain mechanical seals when they are purchased.



FLARE STACKS in Los Angeles area refinery are usually 125 ft. or more above ground. Gases pass through knockout drums and water-sealed pots before entering the flares.

4. Sulfur Dioxide Control

Los Angeles refiners, at a cost of approximately $7,500,000, have installed sulfur dioxide recovery equipment which has resulted in reducing emissions of these gases by 570 tons per day. This represents a 75 per cent reduction from the amount which would escape if the equipment were not installed.

Rule 53 of the Los Angeles Air Pollution Control District specifies that a single source of emission to the atmosphere must not contain concentrations of sulfur compounds, calculated as SO_2, in excess of 0.2 per cent by volume. Most refiners would be in

compliance even without SO_2 recovery equipment.

A January 1947 survey made by the Western Oil and Gas Association showed that approximately half of the SO_2 discharged to the air in the Los Angeles area resulted from refinery burning of sour gases containing hydrogen sulfide and mercaptans.

No data available at that time, or since compiled, substantiates the claim that SO_2 contributes substantially to the smog problem. Nevertheless, the industry voluntarily agreed early in 1947 to curb discharges of those gases by removing H_2S and mercaptans from refinery fuel gas.

Emissions have been cut by the following installations. Some of these were completed as early as 1936, but most have been built since 1949:

1. All refineries are equipped with H_2S removal facilities, most of which are Girbotol units using an amine as the absorbing agent. Some refiners sell the H_2S to sulfuric acid manufacturing plants. The remainder of the H_2S is processed to elemental sulfur in four modified Claus-process plants ranging in capacity from 7 to 100 long tons per day.

2. Spent sulfuric acid sludge is no longer burned. It is either converted to ammonium sulfate, used for sulfuric acid manufacture, or disposed of in other ways that do not release SO_2 to the atmosphere.

3. Spent caustic and waste water containing mercaptans and H_2S are not disposed of without removing the sulfides, or converting them to nonobjectionable compounds from the standpoint of both air and water-pollution standards.

In some cases, air oxidation of sulfides in spent caustic is practiced. Some refiners strip sulfur compounds from waste water, processing these compounds to elemental sulfur.

4. Vapors containing SO_2 are scrubbed with absorbing solutions such as caustic, to prevent air pollution. This operation is performed on vapors from acid storage and handling operations, on vapors from the regeneration of catalyst used in a catalytic desulfurization unit, and on the kiln gases from a catalyst manufacturing plant.

In general, these facilities do not operate at a profit. Operating losses range from a break-even, before capital amortization, to an annual loss of $150,000.

Hydrogen sulfide plants . . . With the exception of one Shell Oil Co. tripotassium phosphate process, all H_2S recovery facilities are Girbotol plants. One of these plants uses M.E.A. (monoethanolamine) solution as the absorbing medium. The others use D.E.A. (diethanolamine).

". . . Most large plants now use only natural gas or refinery gas as fuel . . . switching to standby fuel oil only during cold days or when gas supplies are shut off."

Shell sends its hydrogen sulfide to the Stauffer Chemical Co. plant at Dominguez, where it is converted to sulfuric acid. Standard Oil Co. of California sends H_2S to General Chemical Co.'s sulfuric acid plant at El Segundo.

The Texas Co. and General Petroleum Corp. use a circulating D.E.A. solution to transport H_2S from their refineries to Hancock Chemical Co. by pipeline. Hancock Chemical strips out the H_2S and converts it, along with the H_2S received from Richfield Oil Corp.'s refinery, to elementary sulfur in a 120-ton plant. Reactivated D.E.A. solution is returned to Texaco and General Petroleum.

Union Oil Co., Hancock Oil Co., and Wilshire Oil Co. process their H_2S to elementary sulfur in their own sulfur plants. Capacities of these plants, in long tons daily, are: Union, 60; Hancock, 10; and Wilshire, 15.

Girbotol process has proved satisfactory for absorbing H_2S from both refinery gas streams and light-hydrocarbons liquid streams. Equipment design and operation are conventional and are similar to that used in field treatment of natural gas.

Principal difficulty has been corrosion of carbon-steel equipment, mainly heat-exchanger and boiler surfaces operating at the higher temperatures used in stripping H_2S from the amine. Satisfactory solutions to this problem have included use of a water-soluble corrosion inhibitor and alloy materials such as Monel and 18-8 stainless steel.

Diethanolamine solutions range in concentration from 15 to 25 per cent. The amine is expensive and its loss from the system by entrainment, foaming, or reduction in activity should be minimized. Formation of thiosulfate, thiocynates, and other similar compounds serve to reduce the activity of D.E.A. solution by reducing the free D.E.A. content. The problem, however, is not universal and revivification of the solution has not been generally necessary.

TYPICAL ELEVATED FLARE STACK in use in the Los Angeles area.

Sulfur plants . . . The four sulfur plants are all modified Claus units. They produce liquid sulfur which is sold largely to sulfuric acid manufacturers. The sulfur units are not comparatively complex in either design or operation. Both Union and Hancock Chemical have plants with two converters, while the smaller units of Wilshire and Hancock Oil are of single-stage design. Efficiencies of conversion range from 80-85 per cent for the single-stage to 92-95 for the two-stage plants.

Operational difficulties result occasionally from excessive concentrations of CO_2 which can cause lack of good control in the flow ratioing of H_2S rich gas to air. The presence of heavier hydrocarbon vapors in the feed at times resulted in coke deposition in the bauxite catalyst bed.

Another impurity in the H_2S feed gas which has caused difficulties is ammonia. Solid ammonia sulfate is formed, which tends to plug sulfur drains, particularly at low rates of operation.

The operation of sulfur plants has posed a problem since through design limitations the concentration of SO_2 in the stack gas will normally exceed the 0.2 per cent maximum allowed by law. On the other hand, without operating hydrogen sulfide recovery equipment, the refinery stacks would generally be in legal compliance even though a much larger total amount of SO_2 would be emitted.

The situation has recently been clarified with the adoption of Rule 53.1. This permits scavenger plants to be operated with greater than 0.2 per cent SO_2 in the stack gas, provided the total emission of SO_2 is substantially less with the plant in operation than when shut down.

What you should know about

Design and Selection of Storage Tanks

The floating-roof tank—most widely used and versatile piece of equipment in the fight against evaporation losses—is being constantly improved through joint industry-manufacturer efforts. This article gives points of design and economics which must be considered in choosing between cone and floating-roof tanks and in picking a particular type floating roof.

by William E. Joor
Wyatt Metal & Boiler Works

EVAPORATION losses from stored crude oil and its products are estimated to be at least 50,000,000 bbl. annually in the United States. Since these losses are from the most volatile, consequently the most valuable, hydrocarbons, it is likely that the dollar loss from evaporation exceeds $150,000,000 each year. Normal growth of the industry demands constant expansion of its storage facilities, so the opportunity of loss from evaporation expands steadily.

For these reasons both the managerial and technical staffs of oil companies, large and small, maintain continuous search for equipment and methods to reduce these losses. This accounts for the ever-widening use of conservation-type storage facilities.

Tank manufacturers within recent years, with the aid of the petroleum industry, have succeeded in providing equipment to meet practically all storage requirements. Broadly considered, this equipment includes low-pressure tankage, variable-space tankage, conventional cone-roof tankage, and finally the family of floating-roof tanks. This latter is now accepted as the most versatile and most effective equipment available in the contest with evaporation. This article will deal principally with the use, advantages, and design of floating-roof tanks, though other types will be briefly covered.

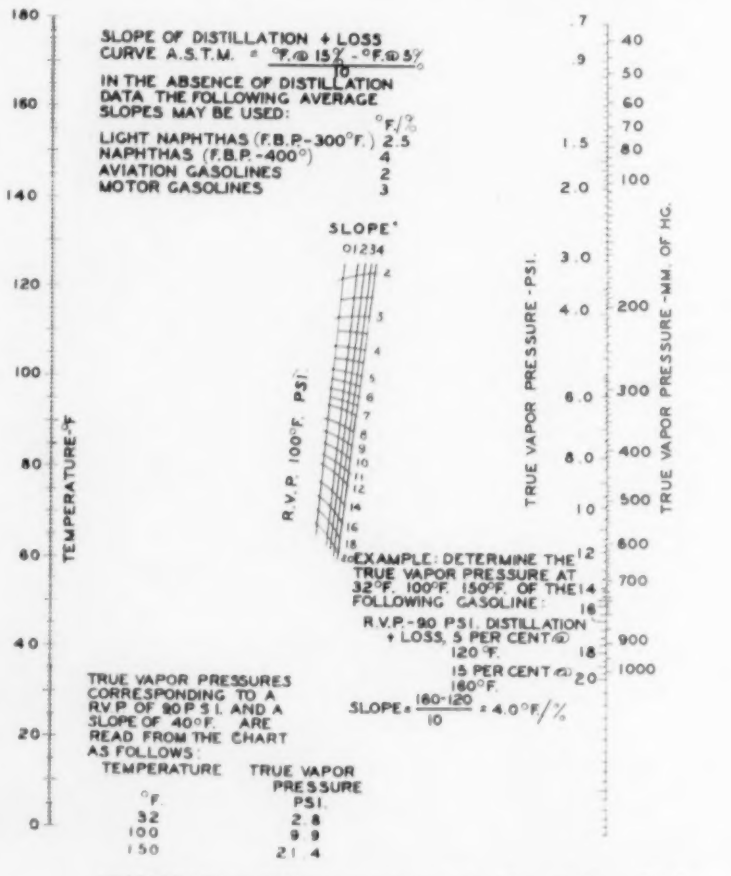
Functionally the floating roof has three principal components: First and most important is its seal and sealing mechanism; next, the roof itself; then its appurtenances. Although the floating roof has gained its wide acceptance within the last 25 years, the first U. S. patent in the art was issued in 1880. The improvements, refinements, and advancements that have come along to make it more effective and more economical are reflected in the fact that some 280 other patents have been issued since.

In this improvement program, engineers have sought and found more effective means of keeping the shoe of the sealing mechanism in close contact with the tank's shell, so as to counteract evaporation at this point. They have designed more effective seals, which are above the stored material in the annular space between deck and shell, where the sealing mechanism functions. Other improvements include removal of spring-actuating assemblies from the top of the roof into annular space between deck and shell; rigid deck structures which ride full surface on the stored oils; operation through fewer moving parts; roof components and assemblies which lend themselves to mass production; and more effective drainage.

The trend in floating-roof design, like that with all manufacturing in this country, is toward a better product at lower cost. The result is that as the oil industry is compelled to provide more and more conservation-type storage as it makes and sells more and better products, it has the assistance of a tank fabricating industry, whose objective is equipment that will match the need.

What Type Storage?

The first requirement in storage selection is to determine which type of storage fits the usage. Requirements of


SLOPE OF DISTILLATION + LOSS CURVE A.S.T.M. = °F.@ 15% - °F.@ 5% / 10
IN THE ABSENCE OF DISTILLATION DATA THE FOLLOWING AVERAGE SLOPES MAY BE USED:
°F./%
LIGHT NAPHTHAS (F.B.P.-300°F.) 2.5
NAPHTHAS (F.B.P.-400°) 4
AVIATION GASOLINES 2
MOTOR GASOLINES 3
SLOPE*
0 1 2 3 4
R.V.P. 100°F. PSI
TEMPERATURE-°F
TRUE VAPOR PRESSURE-PSI.
TRUE VAPOR PRESSURE-MM. OF HG.
EXAMPLE: DETERMINE THE TRUE VAPOR PRESSURE AT 32°F. 100°F. 150°F. OF THE FOLLOWING GASOLINE:
R.V.P.-90 PSI. DISTILLATION + LOSS, 5 PER CENT @ 120°F.
15 PER CENT @ 160°F.
SLOPE = (160-120)/10 = 4.0°F./%
TRUE VAPOR PRESSURES CORRESPONDING TO A R.V.P. OF 90 P.S.I. AND A SLOPE OF 40°F. ARE READ FROM THE CHART AS FOLLOWS:
TEMPERATURE °F. 32 100 150
TRUE VAPOR PRESSURE PSI. 2.8 9.9 21.4

NOMOGRAM for finding vapor pressures of various gasolines. Fig. 1.

... the spark of quality

. . . is never so important as it is in pipelining. *Only* years of experience, the best obtainable supervision, and a desire for perfection have given H. C. Price Co. the reputation for integrity and dependability that is unsurpassed in the pipeline field.

America's foremost pipeline constructors

BARTLESVILLE, OKLAHOMA Cable: HCPCO

each company will vary according to operating conditions, policies of management, payout time, tax structure, products stored, corrosive conditions, and other less tangible factors. Therefore, it is appropriate to outline principal advantages and disadvantages of each type of storage and discuss where each type may most profitably be used.

The conventional cone-roof tank finds its greatest and most useful application in the storage of low-vapor-pressure crude oils of low sulfur content, and finished refined products such as furnace oil, kerosine, diesel oils, lube oils, and heavy fuel oils.

Floating-roof tanks are used most for storage of finished motor fuels, aviation gasoline, jet fuels, volatile naphthas, volatile crude oils and sour crude oils.

No oils having a vapor pressure such that they will boil at normal atmospheric temperatures and pressures should be stored in cone-roof or floating-roof tanks. Oils which boil under these conditions should be stored primarily in low-pressure-type storage. These oils include the natural gasolines, blending stocks, and various cuts which may include propane, butane, pentane, hexane, and some of the higher-boiling-point hydrocarbons.

Some situations may call for storage of volatile crude oils or refined products containing volatile hydrocarbons in vaportight cone-roof tanks using variable-vapor-space storage. The variable-vapor-space storage may be made up as a special-use type of tankage manifolded to a number of cone-roof tanks. Under other conditions this type storage may be built into or replace roofs of cone-roof storage.

Under either condition, variable-vapor-space tankage allows volatile products to evaporate from the oil and fill the vapor space under certain diurnal temperature changes, then return to the oils upon cooling and condensing. However, even under these conditions some volatile oils which may boil at atmospheric temperatures and pressures should not be stored in this manner.

As previously stated, in the storage of all volatile petroleum products, the floating-roof tank is being used more and more. The principal reasons for this increased usage lie in the reduction of breathing and filling losses which are normally experienced in a cone-roof or fixed-roof tank.

In recent years, many oil companies have found it advisable and economical to use floating-roof tanks in storing sour crude oils to lessen the corrosion problem. Other less tangible operating advantages in favor of using floating-roof tanks are evidenced by decreased fire hazards and lower maintenance cost attainable in the more modern floating-roof designs.

The selection of the type of storage needed usually requires a detailed study of the individual storage problem. Oils which boil at atmospheric temperature and pressure present no particular problem. Low-pressure storage is the only practical means available for this type of product.

The situations requiring the use of variable-vapor-volume storage are usually special, brought about by the availability of vaportight cone-roof tankage which may be readily adaptable for this use.

The most complex problem arises when the decision has to be made between vaportight cone-roof storage and floating-roof storage. This requires a careful study of the following items:

1. The type of product to be stored.
2. Vapor pressure of the crudes or products to be stored.
3. Corrosive characteristics of the stored oil.
4. Breathing losses of cone-roof tankage.
5. Filling losses of cone-roof tankage.
6. Turnovers of the tankage.
7. The initial cost of cone-roof and of floating-roof tankage.
8. Maintenance cost of cone-roof and floating-roof tankage.
9. Payout time of floating-roof vs. cone-roof tankage.

In the preparation of such a study, three articles presented during the an-

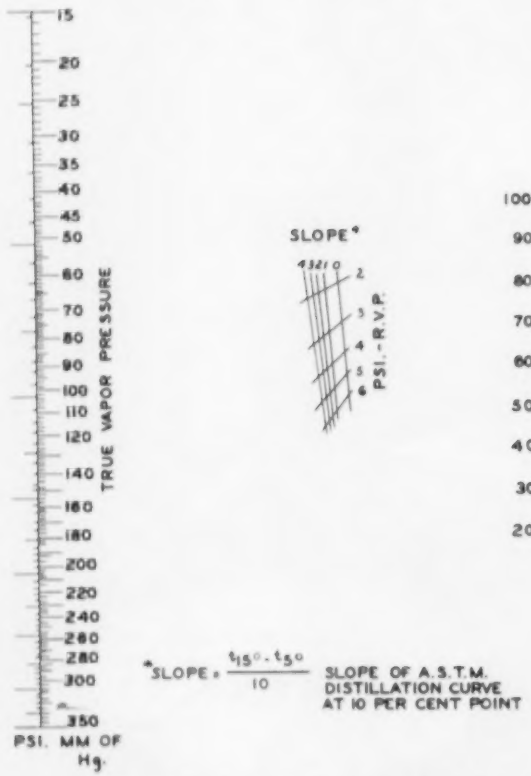

TRUE VAPOR PRESSURE
PSI. MM OF Hg.
SLOPE*
PSI. - R.V.P.
TEMPERATURE - °F.
*SLOPE = (t15° - t5°)/10 SLOPE OF A.S.T.M. DISTILLATION CURVE AT 10 PER CENT POINT

CHART for gasolines with 2 to 6 psi. R.v.p. Fig. 2.

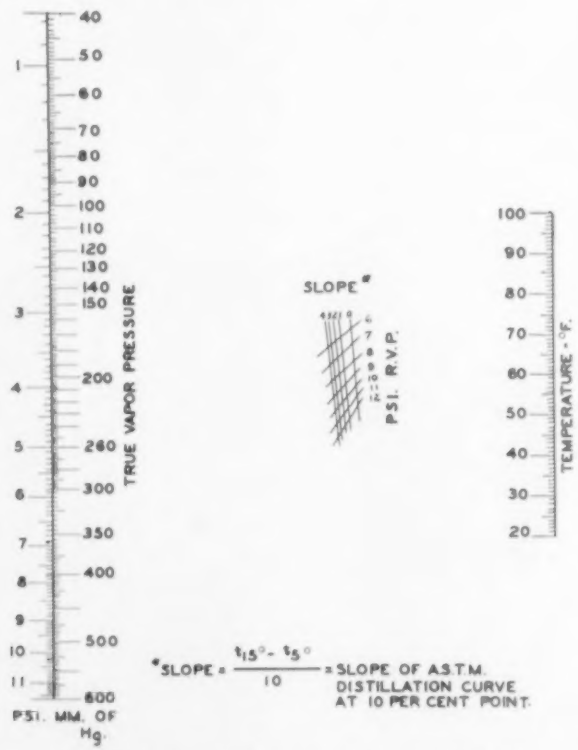

TRUE VAPOR PRESSURE
PSI. MM OF Hg.
SLOPE*
PSI. R.V.P.
TEMPERATURE - °F.
*SLOPE = (t15° - t5°)/10 = SLOPE OF A.S.T.M. DISTILLATION CURVE AT 10 PER CENT POINT

CHART for gasolines with 6 to 12 psi. R.v.p. Fig. 3.

nual meeting of the American Petroleum Institute on November 10, 1952, will prove to be quite helpful. These three papers have the following titles:

1. A Review of the Basic Theory and Mechanism and an Outline of the Practical Problem.*

2. Losses from Cone-Roof Tanks.*

3. Evaporation from Conservation-Type Tanks—A Practical Review.*

Accepting the recommendation of the General Committee of the Division of Marketing, the A.P.I. president, Frank M. Porter appointed, within the institute's Department of Technical Services, a program committee on evaporation loss symposium. These papers were prepared after considerable study by members of the committee.

Reprinted herein by permission of the A.P.I. are Figs. 1, 2, 3, 4, and 5. These nomographs may be used to establish the true vapor pressure of the gasolines or crude oils which may be stored. The following formulas were presented for use in the determination of the average breathing losses which may be sustained from cone-roof tankage:

$$B = \frac{PD^{1.8}}{14.5} F_o F_p \qquad (1)$$

*See The Oil and Gas Journal, November 17, 1952, pages 266-275, 275-289, 289-304.

$$F_o = \frac{1}{5.7} (H + 5)^{0.57} - 0.1 \qquad (2)$$

where:

B = annual breathing loss, bbl.
D = tank diameter, ft.
P = true vapor pressure at the average liquid temperature, psi.
F_o = outage factor (unity for 20 ft.)
H = outage height to top angle, ft.
F_p = paint factor for breathing losses (see Table 2)

The following equation was presented for use in determining the filling losses of cone-roof tankage:

$$F = \frac{3PV}{10{,}000} K_f \qquad (3)$$

TABLE 1—OUTAGE FACTOR, F_o, FOR BREATHING LOSSES

Outage (feet below top angle)	Outage factor (unity for 20 ft.)					
	Company A	Company B	Company C	Company D	Average	From Equation 2
1	0.26	0.28	0.61	0.51	0.42	0.39
5	0.44	0.51	0.69	0.58	0.56	0.55
10	0.64	0.77	0.79	0.69	0.72	0.72
15	0.83	0.91	0.90	0.82	0.86	0.87
20	1.00	1.00	1.00	1.00	1.00	1.00
25	1.17	1.06	1.10	1.20	1.13	1.12
30	1.31	1.12	1.21	1.35	1.25	1.23
35	1.45	1.16	1.31	1.46	1.34	1.33
40	1.59	1.19	1.41	1.52	1.43	1.43
45		1.22				1.53
50		1.24				1.62

TABLE 2—PAINT FACTOR, F_p, FOR BREATHING LOSSES

Paint—	Company A	Company B	Company C	Company D*	Use F_p†
Aluminum	1.00	1.00	1.00	1.00	1.00
Chalking white	0.59	0.75	0.91	0.83	0.75
Light gray		1.10	1.10	0.92	1.10
Black	1.35		1.20	1.25	1.25
No paint				1.25	1.25
Needs repainting				1.25	1.25
New aluminum	0.80				

*Company "D" factors are for roof only. All other factors are for entire roof and shell painted as stated. †Entire roof and shell painted as stated.

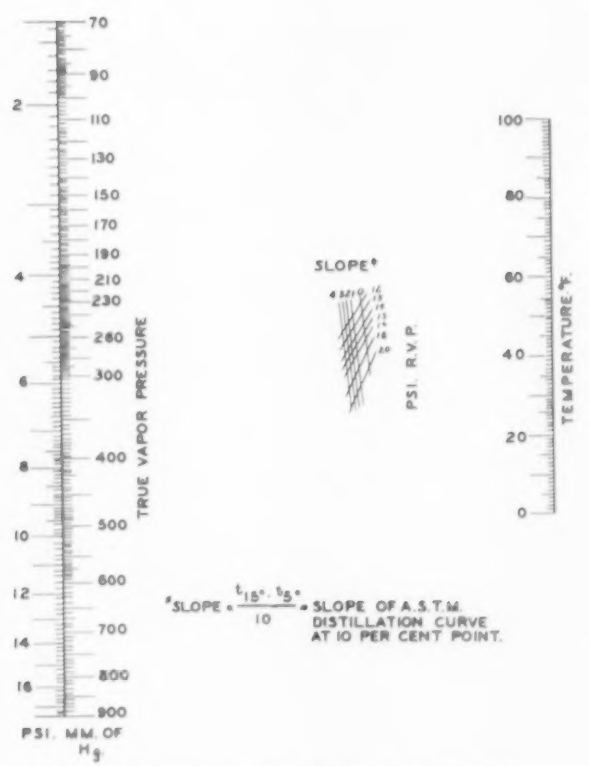

TRUE VAPOR PRESSURE
PSI. MM. OF Hg.
SLOPE°
PSI. R.V.P.
TEMPERATURE °F.
°SLOPE = t15° - t5° / 10 = SLOPE OF A.S.T.M. DISTILLATION CURVE AT 10 PER CENT POINT.

CHART for gasolines with 12 to 20 psi. R.v.p. Fig. 4.

CHART for finding true vapor pressures of crudes. Fig. 5.

where:

F = filling losses
P = vapor pressure, psi.
V = volume of liquid pumped in
K_f = throughput factor taken from Table 3

F and V must be in the same units; e.g., both in barrels. Vent settings, in the order of less than 1 oz. per sq. in., such as are ordinarily used for tanks of this class, have practically no effect on filling losses.

TABLE 3—THROUGHPUT FACTOR, K_f, FOR FILLING LOSSES

Tank turnovers per year	Value of K_f — General refinery service	Marketing plants and terminals
0-10	1.00	1.00
12	0.91	1.00
15	0.75	1.00
20	0.59	1.00
25	0.50	1.00
30	0.47	1.00
40	0.44	1.00
40-60		0.80
60-100		0.50

In the solution of a problem of this type, it is highly recommended that the original papers regarding the subject be obtained and studied carefully. As a further aid in the determination of breathing losses and filling losses, nomograph Figs. 6 and 7 are presented.

Following the procedures outlined above, using the price structures of crude or finished products and data on maintenance cost and capital cost, the payout time for a floating-roof vs. a cone-roof tank may be determined. Tank manufacturers will readily furnish information regarding the capital cost of either type of tankage. The remaining data must be selected for the particular use and application.

Points to Consider in Choosing Tank

When a decision is made that floating roof storage should be installed, a number of points should be considered by the technical staff before the selection of a particular type of roof is made. Generally these points are as follows:

1. Does the design provide for minimum vapor losses at the seal and sealing mechanism?

2. Are the shoes, seal, and sealing mechanism accessible for inspection and removable while the tank is in service? Or must the oil be pumped out and the tank cleaned when repairs are necessary?

3. What effect will corrosive oils and vapors have on the seal and sealing mechanism and can these parts be protected against corrosion?

4. Are there a large number of small parts made of metal which may corrode and cause maintenance difficulties?

5. Is the under surface of the roof in full contact with the oil stored within the vessel, or are there spaces beneath the roof where vapors may accumulate, causing excess corrosion to the deck or other parts of the roof at these points?

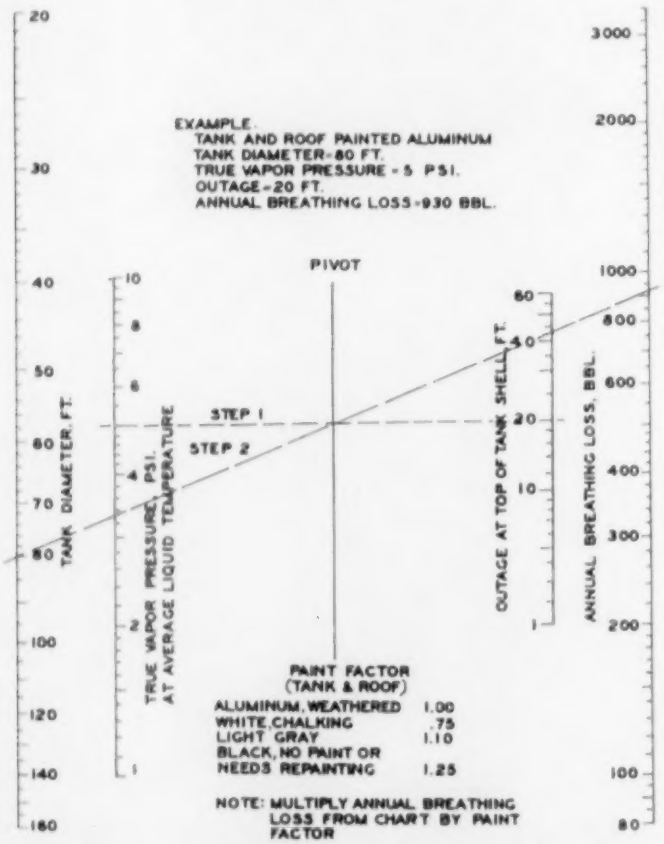
6. Is the upper surface of the deck clear of all structural and other unnecessary appurtenances which require maintenance, painting, etc. Or are the upper and lower sides of the deck designed so that the upper side is clear of all structural members necessary to hold the deck in its proper shape for drainage? Are the necessary structural members beneath the deck of a simple rigid design which may be expected to give long service with little maintenance cost?

7. Where pontoon roofs or twin-deck roofs are being considered, do the compartments composing the pontoon or the twin deck have adequate safety factors in the design? Are these compartments sealed each from the other, making each a vaportight and liquidtight compartment with sealed manholes and openings?

8. What are the number and relative size of the compartments composing the pontoon or the space between the upper and lower deck of the twin-deck roof?

9. Are the slope of the deck and the design of the roof adequate to properly drain the roof?

10. Are all of the appurtenances designed with adequate safety factors and are these appurtenances functionally operable to service the storage requirements?


EXAMPLE.
TANK AND ROOF PAINTED ALUMINUM
TANK DIAMETER-80 FT.
TRUE VAPOR PRESSURE - 5 PSI.
OUTAGE-20 FT.
ANNUAL BREATHING LOSS-930 BBL.
PIVOT
STEP 1
STEP 2
TANK DIAMETER, FT.
TRUE VAPOR PRESSURE, PSI. AT AVERAGE LIQUID TEMPERATURE
OUTAGE AT TOP OF TANK SHELL, FT.
ANNUAL BREATHING LOSS, BBL.
PAINT FACTOR (TANK & ROOF)
ALUMINUM, WEATHERED 1.00
WHITE, CHALKING .75
LIGHT GRAY 1.10
BLACK, NO PAINT OR NEEDS REPAINTING 1.25
NOTE: MULTIPLY ANNUAL BREATHING LOSS FROM CHART BY PAINT FACTOR

NOMOGRAM for finding breathing losses from cone-roof tanks. Fig. 6.

THE AUTHOR

William E. Joor returned to Wyatt Metal & Boiler Works as director of research and development May 1, 1954. After graduation from University of Texas in 1924 he went into the Wyatt's engineering department and headed up that department in 1929. In 1933 he left and was with Mid-Continent Engineering Co., I.V.P. Corp., Petroleum Conversion Corp., and Atlantic Refining Co. before joining the Navy in 1942. Following World War II he was with Kellex as project engineer at both Oak Ridge and at Hanford until 1952 when he joined Girdler Corp. He is the holder of the Joor group of patents under which Wyatt manufactures its floating-roof designs.

Roof drainage—big factor . . . Although floating roofs are not new, the problems of design is to some extent an art

Magcobar means more
than mud alone ... it means ...
constant exploration
for new reserves
Adequate barite and bentonite reserves have become invaluable to the future of the oil industry. And locating and maintaining these high quality raw material deposits is just like finding new oil reserves: you have to go out and look for them years ahead to insure a dependable supply in the future.
Magcobar maintains a geological staff that has located the highest quality raw material deposits in the Western hemisphere. And the search continues day after day so that the oil industry can be assured of adequate drilling mud stocks in the future . . . from Magcobar.
Magcobar
Complete

Meet your friends at the

DRESSER INDUSTRIES

LANE-WELLS PACIFIC PUMPS

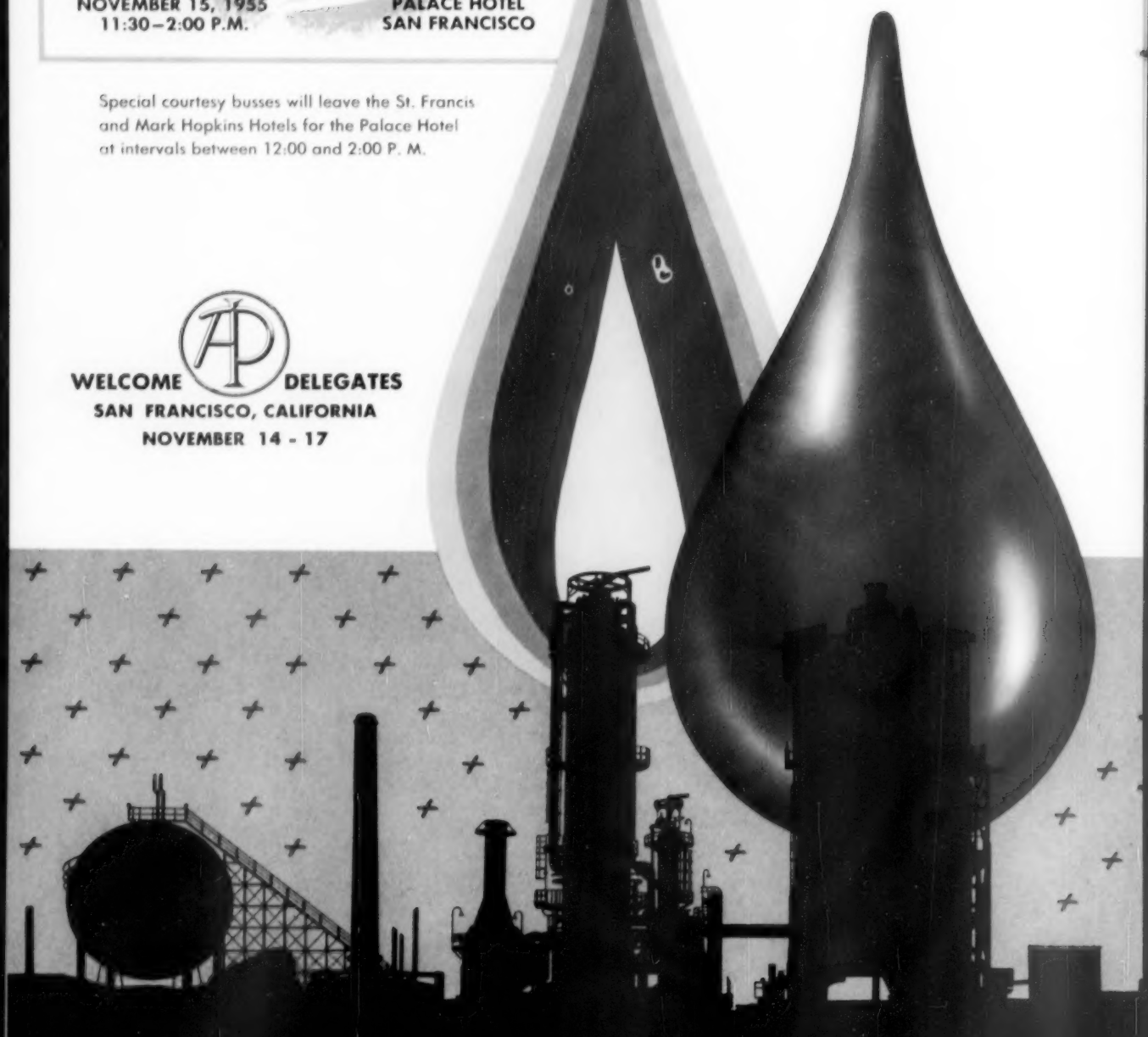
API SNACKBAR

TUESDAY,
NOVEMBER 15, 1955
11:30–2:00 P.M.

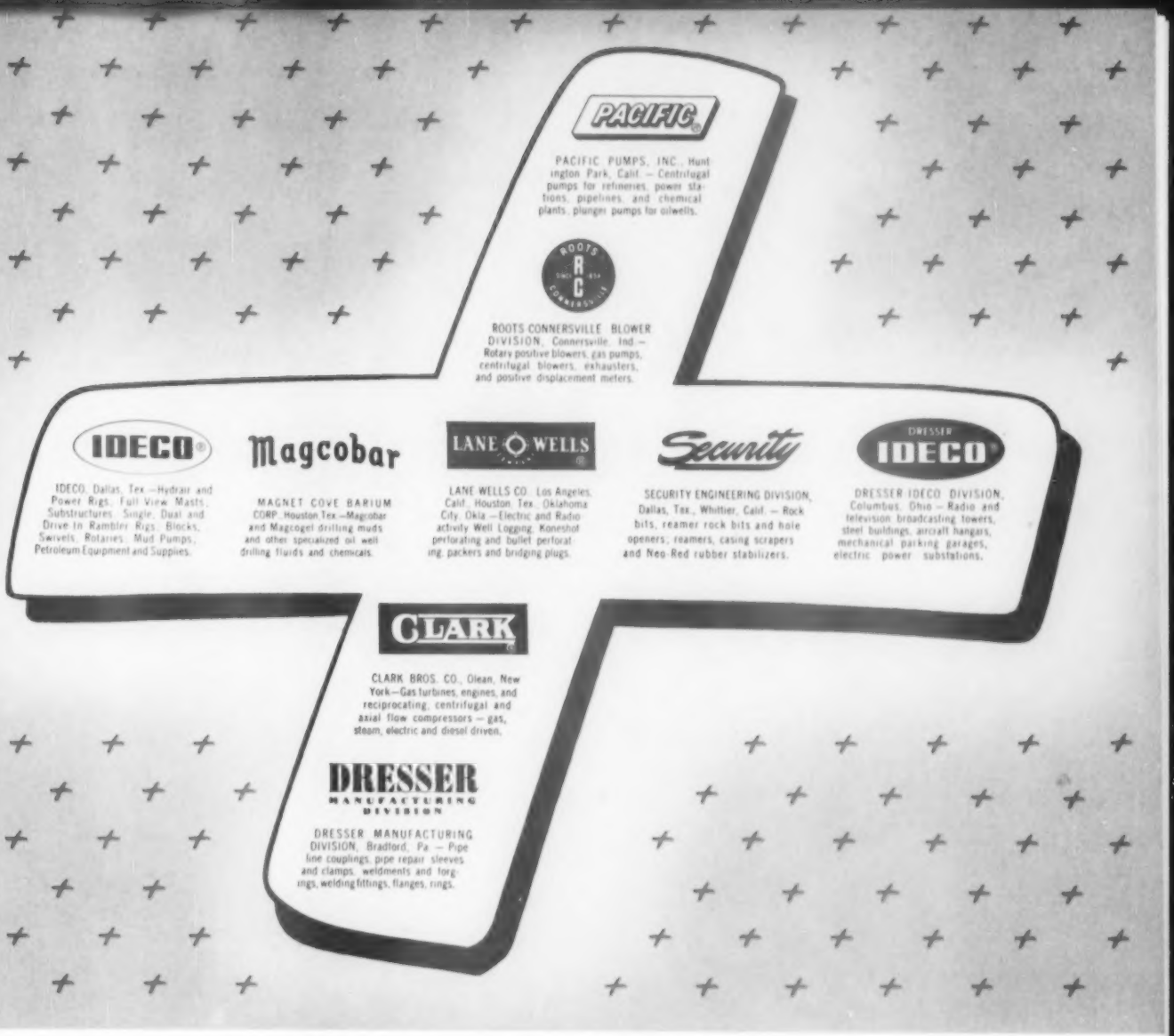
GARDEN COURT
PALACE HOTEL
SAN FRANCISCO

Special courtesy busses will leave the St. Francis and Mark Hopkins Hotels for the Palace Hotel at intervals between 12:00 and 2:00 P. M.

WELCOME DELEGATES
SAN FRANCISCO, CALIFORNIA
NOVEMBER 14 - 17



OIL AND GAS–BASIC ENERGY FOR AMERICAN PROGRESS


PACIFIC
PACIFIC PUMPS, INC., Huntington Park, Calif. — Centrifugal pumps for refineries, power stations, pipelines, and chemical plants; plunger pumps for oilwells.
ROOTS CONNERSVILLE BLOWER DIVISION, Connersville, Ind.— Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, and positive displacement meters.
IDECO
IDECO, Dallas, Tex.—Hydraulic and Power Rigs; Full View Masts; Substructures; Single, Dual and Drive-In Rambler Rigs; Blocks, Swivels, Rotaries; Mud Pumps; Petroleum Equipment and Supplies.
Magcobar
MAGNET COVE BARIUM CORP., Houston, Tex.—Magcobar and Magcogel drilling muds and other specialized oil well drilling fluids and chemicals.
LANE WELLS
LANE WELLS CO., Los Angeles, Calif.; Houston, Tex.; Oklahoma City, Okla.—Electric and Radio activity Well Logging; Koneshot perforating and bullet perforating; packers and bridging plugs.
Security
SECURITY ENGINEERING DIVISION, Dallas, Tex.; Whittier, Calif. — Rock bits, reamer rock bits and hole openers; reamers, casing scrapers and Neo-Red rubber stabilizers.
DRESSER IDECO
DRESSER IDECO DIVISION, Columbus, Ohio — Radio and television broadcasting towers, steel buildings, aircraft hangars, mechanical parking garages, electric power substations.
CLARK
CLARK BROS. CO., Olean, New York—Gas turbines, engines, and reciprocating, centrifugal and axial flow compressors — gas, steam, electric and diesel driven.
DRESSER MANUFACTURING DIVISION
DRESSER MANUFACTURING DIVISION, Bradford, Pa. — Pipe line couplings, pipe repair sleeves and clamps, weldments and forgings, welding fittings, flanges, rings.

put the DRESSER *plus+* to work

The Dresser Plus + is the *extra* plus value you get when you are served by any one of the Dresser Industries. Operating independently to assure maximum individual attention to your specific needs, these Dresser companies work together to provide a versatile group of research, engineering and manufacturing services.

Dresser pays tribute to the many achievements of the great oil, gas and chemical industries . . . achievements that call for increasingly high standards in field and plant equipment and services. Always striving to pace these exacting demands, Dresser constantly amplifies the Dresser Plus + wherever and whenever possible. No other single company provides the same broad range of superior products and services. Dresser equipment and services are the standard of comparison . . . the world over!

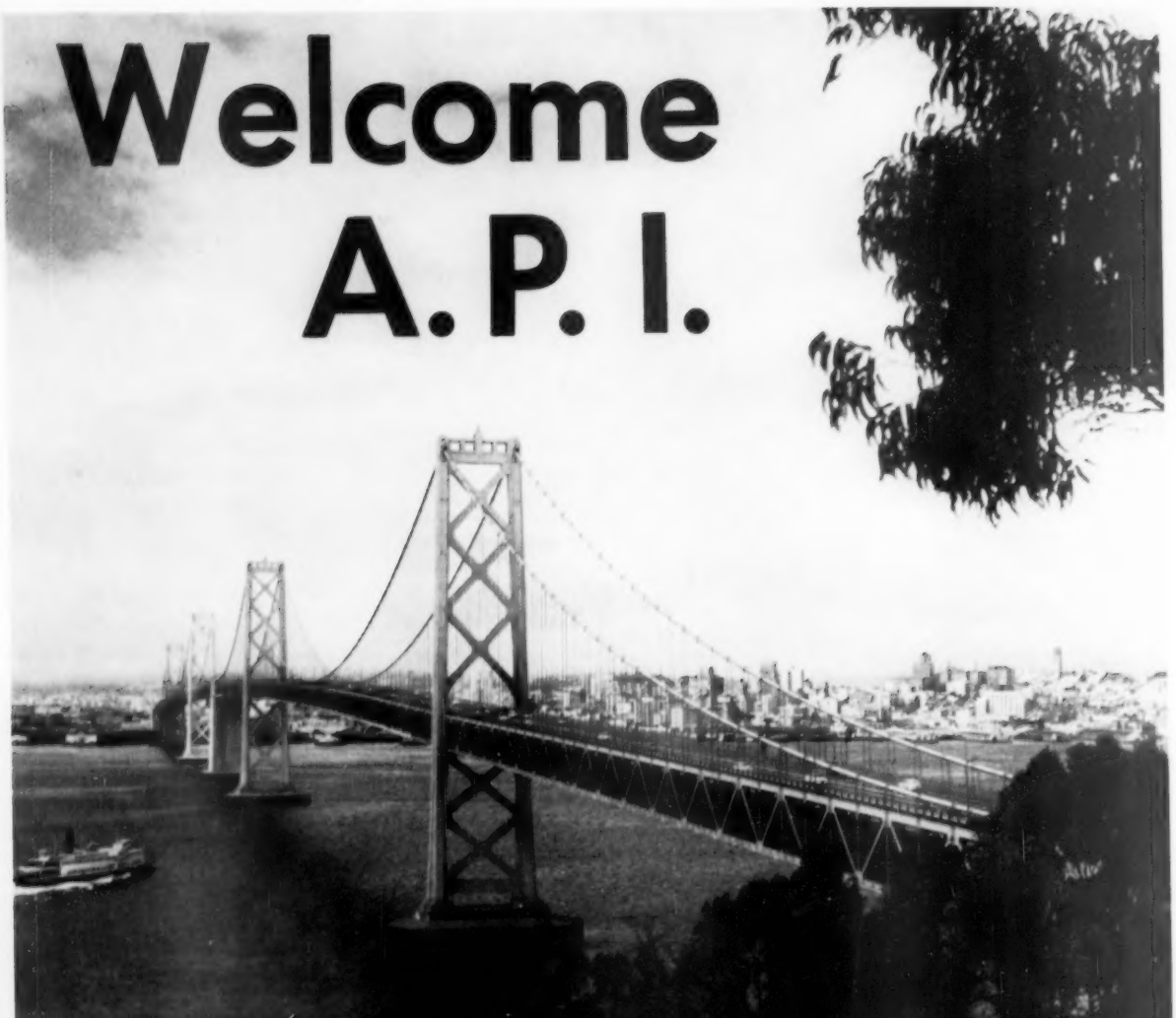
DRESSER INDUSTRIES, INC.
OIL, GAS AND CHEMICAL EQUIPMENT

REPUBLIC NATIONAL BANK BUILDING • P. O. BOX 718 DALLAS 21, TEXAS

BASIC EQUIPMENT FOR THE OIL AND GAS INDUSTRIES

PRINTED IN U.S.A.

Welcome A.P.I.



The Officers and Engineers of Shand & Jurs Company extend to all members of the A.P.I. a hearty welcome to SAN FRANCISCO, the City by the Golden Gate, cosmopolitan in its tempo and famed for the warmth of its hospitality. In this setting, the business of the A.P.I. can be transacted with pleasure and dispatch. During your stay in the San Francisco Bay Area it will be our pleasure to reciprocate in our offices in BERKELEY, the many courtesies which you have extended to our officers and engineers through the years. Whether your purpose be a friendly chat or serious consultation, the latch string is "out" at Shand & Jurs.

Shand and Jurs Co.

BERKELEY 10, CALIFORNIA

NEW YORK
342 Madison Ave

HOUSTON
M & M Bldg

TULSA
Thompson Bldg

CHICAGO
10409 S. Western Ave

LOS ANGELES
714 W. Olympic Blvd

REPRESENTATIVES:

SEATTLE: Nebar Supply Company, 3000 Western Avenue
MONTREAL: Lytle Engineering Specialties, Ltd., 360 Notre Dame St., W.
TORONTO: Lytle Engineering Specialties, Ltd., 69 Eglington East
VANCOUVER: P. D. McLaren & Son, Ltd., 3277 Main Street
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London S. W. 1
Whessoe, Ltd., Works: Darlington, County Durham

rather than an engineering problem. For instance, one of the most difficult problems is the establishment of the proper relationship between the slope of the deck for proper drainage and the physical arrangement of the deck for proper stability.

Suppose, for instance, that the roof to be designed is a pan roof and that it has been decided to make the deck plates in a conical form. It then becomes necessary to balance the drainage slope against the buoyant effect of the oil underneath the cone.

When welding a large rectangular or triangular plate in a roof deck of considerable size, there is inevitably a certain amount of shrinkage of the periphery of each plate which causes these plates to buckle. The buoyant forces tend to buckle most of these plates upward; however, some do buckle downward. As a result, pockets may be formed where rain water accumulates and causes more rapid deterioration of the painted surface.

A great deal of experience, study, and knowledge are necessary to determine the proper slope of the cone which will give adequate drainage and prevent to a large extent the formation of pockets on the deck plates yet not cause too great buoyant forces beneath the deck. These great buoyant forces tend to turn the cone inside out, and also tend to make the roof unstable. The greater the height of the cone the more unstable the roof becomes. It is like trying to balance a perfectly symmetrical wooden top in a cup containing water. It is almost impossible to build such a top so that the axis will float vertically; therefore, the edges of such a roof, if not properly designed, will not lie within a horizontal plane.

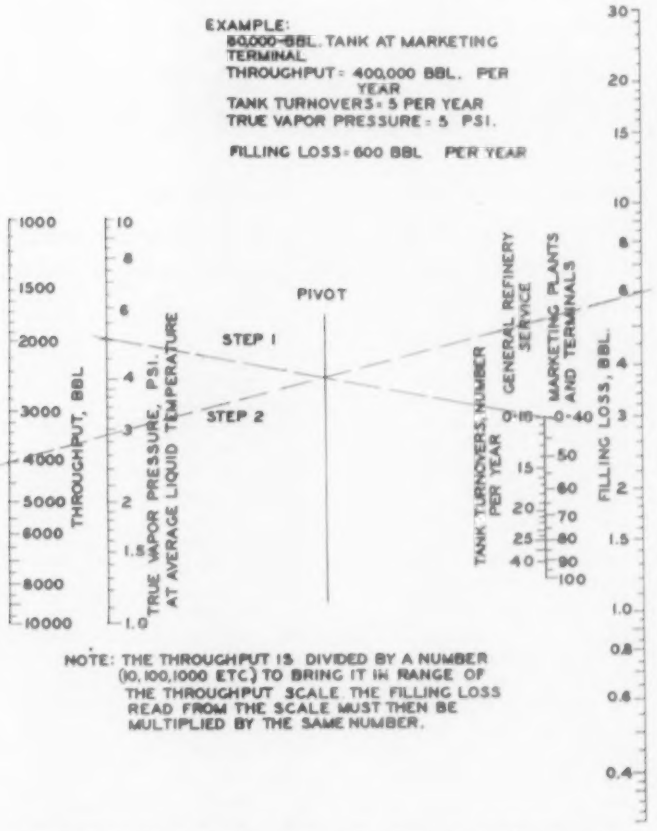
To further prove the point that designing floating roofs is an art rather than an engineering problem, consider the number of U. S. patents which have been issued in this art. There is in the U. S. Patent Office something in excess of 280 patents on floating roofs.

Contrary to the generally accepted idea that floating roofs are a relatively new development—that is to say, within the last 35 years, the first U. S. patent was issued to George W. King on November 9, 1880. This patent is of particular interest in that it is perhaps the original basic patent.

The objectives outlined by George W. King are of particular interest. The patent reads: "The objectives of the invention are to diminish loss by evaporation and to guard against ignition and explosion, to which the petroleum under storage is ordinarily subjected, and to arrest the progress of fire if ignition should occur."

These are still the principal objectives which manufacturers strive to attain in the design of their floating roofs. Nearly all of the patents issued by the U. S. Patent Office since this original are for improvements for details of design of the component parts composing the roof.

The floating roofs being manufactured by Wyatt Metal & Boiler Works are fabricated under license agreements of the Joor group of patents and applications for conservation equipment.


EXAMPLE:
80,000-BBL. TANK AT MARKETING TERMINAL
THROUGHPUT = 400,000 BBL. PER YEAR
TANK TURNOVERS = 5 PER YEAR
TRUE VAPOR PRESSURE = 5 PSI.
FILLING LOSS = 600 BBL. PER YEAR
THROUGHPUT, BBL
TRUE VAPOR PRESSURE, PSI. AT AVERAGE LIQUID TEMPERATURE
PIVOT
STEP 1
STEP 2
GENERAL REFINERY SERVICE
MARKETING PLANTS AND TERMINALS
TANK TURNOVERS, NUMBER PER YEAR
FILLING LOSS, BBL.
NOTE: THE THROUGHPUT IS DIVIDED BY A NUMBER (10, 100, 1000 ETC.) TO BRING IT IN RANGE OF THE THROUGHPUT SCALE. THE FILLING LOSS READ FROM THE SCALE MUST THEN BE MULTIPLIED BY THE SAME NUMBER.

NOMOGRAM for finding losses of gasoline from cone-roof tanks. Fig. 7.

BOOKS

PRINCIPLES OF NUCLEAR REACTOR ENGINEERING. By Samuel Glasstone. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York City 3. pp. 361, $7.95.

This book describes the fundamental scientific principles upon which nuclear reactor engineering is based. It covers the field of design, construction, and operation of reactors for the release of energy in a continuous and controlled manner by the fission of certain atomic nuclei.

Special emphasis is given to the transmission of the fundamental principles into practice because various problems of a somewhat novel nature are encountered. This is due to the peculiar nature of the fission process and its associated radiations.

The book is written for the practicing engineer who wishes to know something of the impact of nuclear engineering upon his professional activities, and for students in engineering schools. The subject is treated in breadth rather than in depth.

SOUTHWESTERN KANSAS, GUIDEBOOK EIGHTEENTH FIELD CONFERENCE, KANSAS GEOLOGICAL SOCIETY, October 1955. Available from the State Geological Survey of Kansas, Lawrence, Kans. 118 pp.

The guidebook covers a wide area in southwestern Kansas, an area that has a variety of geologic features. Among them are the high plains and excellent exposures of early Cretaceous and late Permian sediments, as well as several regional disconformities. In addition to the road log, several technical papers are presented on the structure and stratigraphy of southwest Kansas. Four oil fields in the area are described.

OIL AND GAS PIPELINES IN OHIO. Compiled by Robert L. Alkire. Published by the Department of Natural Resources, State of Ohio. Available from the Division of Geological Survey, Room 11a, Orton Hall, Ohio State University, Columbus 10. $1.50 plus 5 cents tax in Ohio for folded map; rolled in a mailing tube, $1.85.

This revised edition of a five-color, complete map of Ohio's oil and gas pipelines is done on a scale of 1 in. equals 8 miles. The gas portion contains the names of utility companies, the size, number, and ownership of transmission lines; the number of consumers; points of distribution; compressor stations; underground gas-storage areas; and gas lines entering the state. The oil section includes location of refineries; and their capacities and principal refined products; crude and product transmission lines, direction of flow, compressor stations, and large storage terminals.

How do you find a market when you bring in an oil well?

Who posts crude prices, and how?

Pipelines don't own crude oil—who does?

Who owns all the crude that's in storage?

How does orphaned crude find a home?

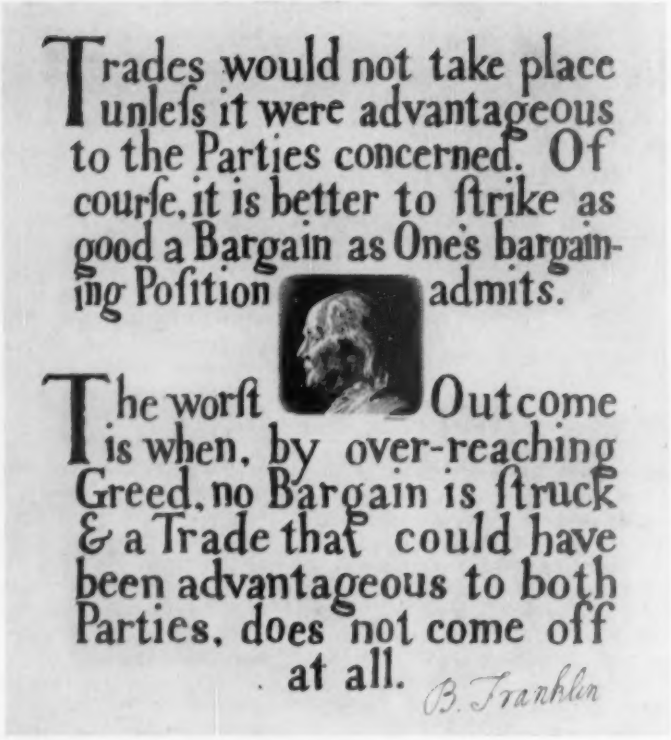
What happens to the supplying wells when a refinery shuts down?

Why do crude buyers make low nominations?

Why do the majors give producers a "free ride" in marketing their crude?

With so many chances to "pull a fast one," why do crude traders act like a bunch of little Sir Galahads?

?


Trades would not take place unless it were advantageous to the Parties concerned. Of course, it is better to strike as good a Bargain as One's bargaining Position admits.
The worst Outcome is when, by over-reaching Greed, no Bargain is struck & a Trade that could have been advantageous to both Parties, does not come off at all.
B. Franklin

This motto hangs in the crude-oil department of one major company. It typifies the working code of ethics that makes possible the elaborate and often informal exchanging of crude.

The Answer Is the Crude-Oil Man

He's a mystery to most . . . the least understood cog in the industry's machine. Even the guy in the next office doesn't know what he does. But what he does will amaze you. Read this and you'll learn things about your business you never knew before

by Henry D. Ralph

JOE, I'm 3,000 long on Oklahoma sweet but I need Wyoming black. Can you help me?"

"Well, Bill, I can let you have 2,500 black at Casper if you'll take 1,000 West Texas sour at Houston."

"You're a robber, Joe, I'll have to peddle 500 of that sour to somebody someway, but my refinery wants the black, so it's a deal."

The phones are hung up on that long-distance call, and another crude-oil exchange has been completed—typical of dozens that are being made all over the country every day.

This crude-oil trading is a highly important part of the oil business, but one which few people in the industry understand.

Did you ever wonder what happens to crude oil after it leaves the producer's lease tanks? Oh, sure, it moves to refineries through pipelines, barges, or tankers. But that's just the physical end of it.

Who owns title to the oil during its journey? Who routes it from fields to terminals to refineries? Why doesn't a producer have to hunt for a refinery that will run his crude? How do refineries always get just the right amount of the kinds of crude they need? How can producing, transporting, and refining operations all keep going steadily without getting out of step with each other?

The answer is the crude-oil man.

Joe and Bill, in the example just cited, are the crude-oil men for two competing, integrated oil companies. The situation surrounding that brief telephone conversation was something like this:

The Illinois refinery of Bill's company wants to cut down its runs of Oklahoma high-gravity crude and substitute Wyoming low-gravity crude. Perhaps its asphalt sales have improved or there has been some shift in its products yield or marketing pattern. At any rate, the refinery manager figures that he can make more money out of the low-priced Wyoming black oil, even though it has a lower gasoline yield, than he can from the higher-priced Oklahoma crude after considering all the factors involved—relative gravities,

SMITH OIL CO.

Status of Crude Oil Agreements as of July 1, 1955

With: BIG BANK OIL CO.

We Received	Barrels	Bal. Due Us
Beginning balance		976
Runs from leases owned or controlled by you, list attached	7,850	
Deliveries to X Pipe Line Co., Seminole Sta., Our Account	35,000	
Deliveries to Y Pipe Line Co., Wood River, Ill., to Jones Oil Co.	42,000	
Total	85,826	

We Delivered	Barrels	Bal. Due You
For Your account, Z Pipe Line Co., Oklahoma City Sta.	14,000	
To "A" Refining Co., Account "B" Refining Co., at your credit at Chicago, Ill.	60,000	
Total	74,000	11,826

If figures hereon do not agree, address communications to: Remarks:

Here's a typical monthly statement that one big crude buyer sent another one to show the status of their purchase-and-sale arrangements—"Only the names have been changed to protect the innocent," as the TV whodunits say.

BLANK OIL CO.

Schedule of Crude Oil Supply and Demand, October 1955

SUPPLY	Bbl. dly.
Production from own leases	70,000
Purchases under exchanges	23,000
Purchases of free oil	4,000
Total supply	97,000
DEMAND	
Sales under exchanges	20,000
Sales to own refineries	30,000
Sales to nonaffiliated companies	50,000
Total demand	100,000
Draft on inventories	3,000

Forecast of a month's operations of the crude-oil department of a large integrated company, slightly abbreviated and with figures rounded. Crude-oil men prepare such forecasts many months ahead, and revise them constantly.

posted field prices, gathering charges, pipeline rates, and the processing equipment and marketing pattern of that individual refinery.

So Bill was instructed to stop delivering so much Oklahoma crude and to get Wyoming crude instead.

And that's not always as easy as it sounds. It's not as simple as a housewife stopping delivery from the Dairy Dream milkman and ordering a quart a day from Creamery Queen.

Bill's company has a lot of its own production in Oklahoma, and it buys a lot more from other producers. It can't stop production. Under the law his company is a "common purchaser" and it must take ratably from all producers from whom he purchases, up to the maximum allowable set by the state commission. And the production department of Bill's company isn't about to make a voluntary curtailment of its own output just to please the whim of that Illinois refinery manager.

So Bill has to "find a home" for that orphaned 3,000 bbl. per day of high-gravity Oklahoma sweet crude.

Also, Bill's company doesn't produce a barrel of Wyoming black oil, doesn't buy any from producers, and therefore doesn't regularly ship crude between Wyoming and Illinois.

But Joe's company does. Hence the phone conversation reported above. With those few cryptic words, Joe's company agreed to buy 3,000 bbl. daily of Oklahoma crude from Bill's company. It will continue to move through the Bill company pipeline, but Joe has the problem of finding a home for it, either in his own company's refineries or through sale to some other refiner.

In exchange, Bill agrees to buy 2,500 bbl. per day of Wyoming black oil, which he wanted badly, plus 1,000 bbl. per day of West Texas sour, which he didn't want at all. Joe knew that, and he knew that Bill knew he knew it. Also, Bill knew that Joe was long on West Texas crude and would try to make him take some. But it was worth it to find a home for the Oklahoma crude and to get the Wyoming crude for his refinery.

So Bill "traded" 3,000 bbl. for 3,500 bbl., but what he really did was to sell 3,000 bbl. and agree to purchase 3,500 bbl. Who got the better of the bargain, and who pays whom and how much? That was a secondary consideration at the moment. Each man thought it was a good deal for his company, and money wasn't mentioned in the negotiations.

They Think in Barrels

Crude-oil men deal in both barrels and dollars, but when they are making a trade they talk only barrels. The posted prices of crude of various grades and in various locations, the field gathering charges, and the trunk pipeline rates are all published figures, equally applicable to all and well known to the crude-oil men. But each crude-oil man has a "bogey," that is, a certain number of barrels of oil per day that he must acquire or dispose of, net, during a current period. So if one deal leaves him 500 bbl. per day "long," he must hustle to find a new home for 500 bbl. of crude of a type or in a location that his refinery doesn't want.

Every purchase-and-sale deal is based on the published price of the crude plus transportation at the point where title changes hands. The fact that the number of dollars involved may be different although the number of barrels is the same is important to both companies, but the crude traders never offer or take any money "to boot" in negotiating an exchange.

After the two traders make a deal—over the 'phone or otherwise—formal purchase and sale contracts are exchanged between the crude-oil departments of their companies. Each one writes checks to the other for the oil taken, and while the number of barrels exchanged between the two may be identical in a given month the number of dollars almost never is the same.

In this particular trade that Joe and Bill just made, Oklahoma sweet crude has a higher posted price than either the Wyoming black or the West Texas sour crude; but the correct posted price is applied to the volume of each crude to determine the amount due each seller. If either crude is sold at a point other than the field tanks, the cost is increased by the applicable pipeline rates to the point of delivery.

Now Bill has the job of getting rid of 1,000 bbl. a day of West Texas sour crude. His company has a refinery on

the Gulf Coast, but it is already running just about all the sour crude it can handle without exceeding the sulfur specifications of its products.

Nevertheless, Bill took the 1,000 bbl. of West Texas sour. He figured his refinery can use as much as 500 bbl. per day, or at least put it into storage until Bill can sell the equivalent amount to somebody else.

It is not unusual for a regular customer to agree to absorb an extra 500 bbl. per day over several months or even a year with the understanding that this quantity will be underdelivered against his account during a similar future period. Such "over" and "short" arrangements make possible a certain degree of flexibilitiy to accommodate temporary or unforseen fluctuations in the supply of a seller or the needs of a buyer.

Meanwhile, Bill has to find a home for the other 500 bbl. immediately. He knows of several other Gulf Coast refineries that are equipped to handle sour crude. They are already getting all of this type crude they need, but maybe he can figure out a deal that will save them a cent or two in transportation cost, or he can take back 500 bbl. per day of crude in some other part of the country that this refinery can't use conveniently.

So Bill picks up the phone and calls a few other crude buyers in other cities. Before the day is over he has found a home for that 500 bbl. of West Texas sour, but has had to take the same quantity of some other crude which he doesn't want but which he is sure he can swap to somebody else who will let him have the additional 500 bbl. of Wyoming black oil his Illinois refinery needs to replace the 3,000 bbl. of Oklahoma crude. It's like a game of "musical chairs."

Sound complicated? It's all a typical day's work for the average crude-oil man. And they love it.

He's in the Middle

The crude-oil man occupies a peculiar, little-known, and highly important position in the oil industry. He is the industry's "middleman"—the marketing link between the producer and consumer of crude oil. He performs an economic function roughly comparable to that of commodity exchanges, brokers, or "factors" in other industries.

The crude trader himself never sees a gallon of crude oil, never touches any money except his salary, and never makes a speculator's profit out of difference in prices of the crudes exchanged.

He may buy as much as $1,000,000 worth of crude a day, but most of this would be under arrangements of long standing and not involved in day-to-day trading. His company takes legal pos-

When crude-oil men get together . . .

Making nominations to purchase crude is an important function of a crude-oil man. Here D. A. Young, president of Sinclair Crude Oil Co., tells the Texas Railroad Commission how much oil his company intends to purchase in Texas during the coming month.

CRUDE-OIL men meet each other in hotel lobbies, conventions, and various gatherings. A large gathering of crude-oil men is always present at every allowable hearing held by regulatory commissions in states with market-demand proration. Making nominations to purchase crude is one of the important functions of the crude-oil departments of major companies. The greatest single gathering of oil traders is the monthly statewide allowables hearing of the Texas Railroad Commission. The buyers have an informal buffet supper in Austin the night before every allowables hearing, where they exchange information on market conditions and negotiate exchanges and deals. This dinner, and the hearing the following day, are attended by some crude buyers who purchase no crude in Texas, just because it is such a good place to meet other traders and exchange information. Many crude-oil exchanges are worked out in informal conversations.

P. M. (Pat) Broach, manager of crude-oil distribution, Sunray Mid-Continent Oil Co., Tulsa; J. M. Coates, manager of crude-oil supply, southern division, Gulf Oil Corp., Houston; Don F. Haynes, manager of crude-oil distribution, Humble Oil & Refining Co., Houston, and R. E. Rourke, crude-oil purchasing agent, Republic Oil Refining Co., Texas City.

they swap oil—and yarns

Gordon L. Gano, manager of crude marketing and transportation, Cities Service Refining Corp., Lake Charles, La.; M. T. Smith, crude oil representative, Shell Oil Co., Midland, Tex., and A. E. Jago, manager of transportation and supplies, Shell Oil Co., Houston.

John E. Brewster, manager of crude-oil purchasing, Pan-Am Southern Corp., New Orleans; John E. Harris, Jr., manager of crude-oil supply, Phillips Petroleum Co., Bartlesville, and D. R. Wall, manager of crude-oil purchases and sales, Magnolia Petroleum Co., Dallas.

Sam H. Casey, general manager of supply and transportation, Pan-Am Southern Corp., New Orleans; N. E. (Nick) Barnett, assistant manager, crude-oil department, Tide Water Associated Oil Co., Houston, and R. W. Pitcher, manager, crude-oil purchasing department, Pan-American Production Co., Houston.

John Edwards, manager of crude-oil supply, The Texas Co., Houston, and Ralph O. Dietler, chairman of the board, Stanolind Oil Purchasing Co., Tulsa.

Earl Lamm, vice president for crude-oil procurement, Clark Oil & Refining Corp., Dallas; W. L. Ewell, assistant manager, crude-oil purchases and sales division, The Texas Co., Houston, and A. J. Morris, manager of supply and transportation, Crown Central Petroleum Corp., Houston.

H. G. (Bill) Williams, vice president, crude-oil purchases, Rock Island Oil & Refining Co., Wichita, and Gerald McGrew, manager, crude-oil supply division, Cities Service Oil Co., Bartlesville.

session of the oil at the points specified and either tenders it to a pipeline for a specific consignee or routes it to its own storage tanks for later disposition. The crude-oil man's operations do much to improve his company's profit position by acquiring the most suitable crude for its refineries at the lowest possible delivered cost, but his department as such seldom shows much of a profit itself.

We think of the oil industry as being divided into production, pipelining, and refining. But if it were not for a small group of crude-oil men, virtually unknown to the rest of the industry, these three big physical operations could not function smoothly and without interruption.

When You Get a Well

Let's say you are an independent producer and you bring in a well good for 100 bbl. a day. Do you have to hunt for a buyer, solicit refineries to handle it, or haul it to market? Normally not, unless your well is remote from any pipeline. In 99 cases out of 100 the independent producer never has to give a thought to his market.

You may think the posted field price is too low, or your allowable is too small, but you take it for granted that somebody is going to move the oil from your lease tank and dispose of it some way or other. What happens to your crude after you produce it is seldom any special concern of yours.

In some fields you may have a choice of buyers. Then you will try to select one that has a reputation for square dealing in good times and bad. A buyer who will offer a bonus above the posted price when crude is short is apt to try to cut under the posting or drop the lease connection when crude is long. When crude is short you will have buyers after you before your well is completed, and when crude is long you may have to hunt them up and "remind" them that you brought in a producing well. But you can be pretty sure that some buyer operating in the vicinity is going to take your oil and get it to a refinery somewhere.

That's where the crude-oil man comes in. Once an agreement has been made to take your oil (whether you solicit a buyer or a buyer solicits you), the rest is routine as far as you are concerned.

Let's say you sell your crude to Maiger Oil Co., which already is a substantial buyer in the vicinity of your well. Maiger either runs a gathering line to your lease tank or requests a common-carrier pipeline to do that and to start moving your crude for Maiger's account. Your crude starts to move at once, although you may not start getting payments until all necessary

ANALYSIS OF SALES AND PURCHASES, MONTH OF MARCH, 1948

Company and district--	Sales	Purchases
Continental Oil Co.:		
West Texas (Permian)	...	604
West Texas (Devonian)	...	40
Louisiana Gulf Coast	800	...
Oklahoma	92	...
Subtotal	892	644
Contracts:		
Kansas (Kaw)	1,866	...
East Texas	.....	1,054
Conroe	.....	941
Total	2,758	2,639
Esso Standard Oil Co.:		
Louisiana Gulf Coast	3,999	.....
N. Louisiana and S. Arkansas	1,377	.....
Subtotal	5,376	.....
Contracts:		
Refugio, light (Humble)	.....	4,000
Total	5,376	4,000

Note: Excluded from the quantity sold are 3,165 bbl. of Magnolia, Ark., crude for which we received advance delivery of Venezuelan crude during 1947.

Magnolia-White Eagle:		
East Texas	668	560
West Texas* (Permian)	1,256	328
Southwest Texas	713	...
Louisiana Gulf Coast	...	56
Oklahoma	12	...
Kansas	17	...
Subtotal	2,666	944
Contracts:		
East Texas Scrubber	.....	31
Seeligson	.....	453
Total	2,666	1,428

*Sales and purchases of Seminole crude excluded since by agreement as to gathering, each company purchases one-half of total production in the Seminole field, and therefore, it is impractical to account for specific sales and purchases from individual leases.

Gulf Refining Co.:		
West Texas (Permian)	893	...
West Texas (Ellenburger)	47	...
Texas Gulf Coast	8	98
Louisiana Gulf Coast	...	399
Oklahoma	125	...
Subtotal	1,073	497
Contracts:		
West Texas (Ellenburger)	5,000	...
Venezuela	.....	5,000
Total	6,073	5,497
Toronto Pipe Line Co. (British American):		
West Texas (Permian)	.....	50
Southwest Texas	1,067	...
Total	1,067	50

Note: Toronto has made available to use approximately 400 bbl. of Midway, Tex., crude oil. This crude is purchased by Republic. As a result of this sale to Republic, Sohio continues its sale to us of approximately 200 bbl. daily of Fields, La., crude.

Typical excerpts from the actual "balance sheet" of a major company showing representative exchanges. Note that the net result of some elaborate trades is rather close to a balance.

signatures are on the contract and Maiger's lawyers have checked the legal titles of all owners of interests in your oil as reflected in the division orders. In that case the money is held in a "suspense account" until everything is cleared up.

Now Maiger doesn't want your 100 bbl. a day. It already has more than it can use of that type of crude in that area, coming from its own wells and its regular purchases from other producers. But old-time custom and modern-day decency almost require it to take your oil except under very unusual circumstances. Buyers feel a sort of moral obligation to provide a market for independent producers (this doesn't always function 100 per cent, but does most of the time). Besides, Maiger may foresee a day when it will want your crude—and your good will—very badly.

Now your 100 bbl. a day is in the custody of Earl Byers, manager of the crude-oil department of Maiger Oil Co. Earl and his assistants have to

Glossary of Crude-Oil Purchasing Terms

You've heard these expressions . . . and wondered at their meaning . . . perhaps used them incorrectly. Here's what they mean in the private lingo of the crude-oil man

CRUDE BUYER—Loosely applied to any crude-oil man, although he almost always is also a seller at times and may sell much more than he buys.

TRADE — A purchase-and-sale arrangement, synonymous with exchange. Actually, two separate contracts, one to buy, one to sell.

FIND A HOME — To sell some crude oil. Usually applied to a supply of new crude acquired by the buyer's company, or to oil made available to the market by expiration of an old purchase contract.

CONTROLLED OIL—(1) Purchases from company-owned leases (including for practical purposes the one-eighth oil which is not actually controlled). (2) Purchases from leases where the company buying the oil has previously obtained the right to buy oil if production is found. A company may farm out a lease to some other party to drill and retain the right to buy the oil; or the purchasing company may buy or sell a lease or an interest in a drilling deal and retain the right to buy the oil from the whole block of leases or a part of the acreage. (3) Production obtained by contract.

FREE OIL—Crude that is available for any competitor to obtain at any time. It may be produced by independents or integrated companies. Most purchases from leases are made on open division orders, that is contracts that may be terminated at any time without notice or without reason by either party.

SALES—Sales are classified into (1) sales to company-owned refineries or affiliates, (2) straight sales to others, and (3) trades and exchanges. However, all are outright sales, with payment in cash monthly.

DIVISION ORDER — Instructions amounting to a contract, to take oil from a producing lease and to make payments to parties of interest (such as shares to royalty owners, overrides, etc.).

CONNECTION—Literally the physical connection of a gathering line to a producer's lease tank. Commonly used to mean an agreement to sell oil at the lease, whether on long-term contract or open division order, including cases where there is no physical connection with a pipeline.

GATHERING—Collecting oil from leases (by truck, barge, or small pipelines) and taking it to a central point for movement through a trunk pipeline. The published charge for gathering is usually 10 cents per barrel, but may be as low as 5 cents or as high as 12½ in some fields. Where trucking is involved, the charge is usually 25 cents or more, in which case the producer may have to pay the difference over the usual gathering charge. Gathering may be done by a pipeline company, the crude-oil department of a major company, or an independent buyer.

TENDER—To offer oil to a trunk pipeline, or oil so placed in a pipeline. Some trunk lines require a minimum tender of 10,000 bbl.

TARIFF POINT — A location at which a trunk pipeline is equipped to receive or deliver crude, as listed in its published rate schedule.

CRUDE - OIL DEPARTMENT—The department of an integrated company (often quite small in personnel) that takes possession of crude from the company's producing department at the leases, buys crude from other producers, supervises gathering, tenders to pipelines, routes crude to consignees, maintains storage, sells crude to company-owned or other refineries, exchanges crude with others, and collects for crude sold. Its operations are often confused with those of pipelines or the company's producing department, because frequently the crude-oil department will have employes of pipelines or other departments perform the actual gathering and other activities for its account.

LONG—A condition where there is more crude oil available than the customary markets will absorb readily. May apply to the industry nationally, or to the individual situation of a particular crude-oil man.

DISTRESS OIL—Crude oil looking for a home; particularly crude so undesirable because of location, quality, or generally long supply that it may be offered at less than the posted price in order to find a market.

POSTED PRICE — A schedule of prices at which a certain buyer will purchase crude oil at the lease, specifying location, gravity, and grade. It is literally posted in buyers' offices and elsewhere and given wide distribution to all interested. It is issued by crude-oil buyers, and is subject to change without notice. Where a certain buyer is the dominant purchaser in a field, others usually adopt its postings, but purchase contracts may be made by reference to the postings of a third party not involved in the transaction.

find a home for your crude and a lot more like it that Maiger's refineries don't want at the moment.

But Earl Byers won't let you down. You'll never see him nor hear of him, and you don't have to pay him any commission. But he'll burn up the long-distance wires until he finds a market for your crude.

Of course in times where there is plenty of crude and then some, and storage tanks are getting full, Earl Byers wishes that production would be held down to the volume that refineries are running. So if your state has a market-demand proration system Earl will appear at the allowable hearing of the regulatory commission and nominate to buy less crude next month than he took last month.

Then you and other producers—including Maiger's own production department—will scream and protest and blame it on imports. But Earl Byers and the other crude-oil men have no more control over that than you have. It's their business to study market demand and to know where they can sell crude and how much, and if all of them have trouble getting rid of crude it's a pretty good indication that supply is getting out of hand.

But even if the supply remains greater than the demand, Maiger will continue to take your oil at the posted field price up to the limit of your allowable. Under unusual conditions Maiger may invoke purchaser proration (often, but usually wrongly, called "pipeline proration") and will cut down on its take from all wells, including its own. This happens when the purchaser can't physically handle all the oil it has committed itself to take, due to full storage tanks or other reasons.

It Ain't Altruism

Why does Earl Byers do all these things to get and keep a market for your crude? Because he's a good fellow? (He is, of course. All crude-oil men have to be. It's an occupational qualification). Because Maiger is altruistic and believes in being kind to independents?

Neither one. All crude traders work the same way. It's done because that's the only way the oil industry could possibly operate.

There is no such thing—in the United States, at least—as a completely balanced, wholly self-contained integrated oil company. There is not one that produces and refines only its own oil and never buys or sells any crude. If there were such, independent producers and refiners would be in a bad way.

Some companies are approximately in net balance, on paper, in that the crude production from their own wells is about the same as the capacity of their refineries. But always many of the wells—maybe most of them—are hundreds of miles from the refinery, scattered in several states, and impossible to hoop up to the refinery by a pipeline except at prohibitive cost.

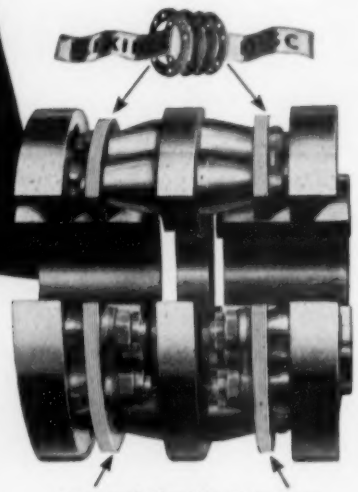
Fortunately, each company doesn't have to build its own pipeline network. Instead it takes advantage of the efficiencies offered by the country's network of common-carrier crude-oil pipelines and of the crude-exchange services provided by the industry's crude-oil men.

The production department of Maiger Oil Co. operates very much like an independent producer. It brings in wells wherever it can find oil, and usually without much worry about the over-all supply-and-demand situation or what refinery will finally get the particular barrels of oil produced by one of its new wells. When it completes a well it notifies Maiger's crude-oil department, and Earl Byers takes over.

They Have to Swap

If another company is already purchasing in that area, Earl will ask it to buy this new oil. It will almost always do so, but Earl may have to buy back a similar quantity from it at a different place. If crude happens to be short at the time, the second company will

Specify THOMAS ALL METAL FLEXIBLE COUPLINGS for Power Transmission to avoid Costly Shut-Downs



REFINERS! PIPE LINE MEN! DRILLING ENGINEERS! LABORATORY TECHNICIANS!

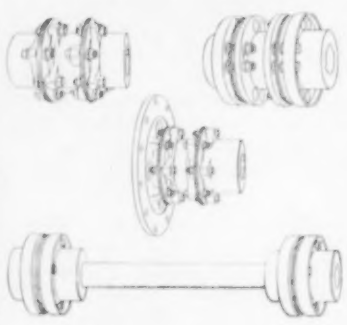
You can use Thomas Couplings to your advantage on Pumps, Compressors, Cooling Towers, Rigs or any other tough job where continuous operation and dependability are required. Thomas Couplings can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

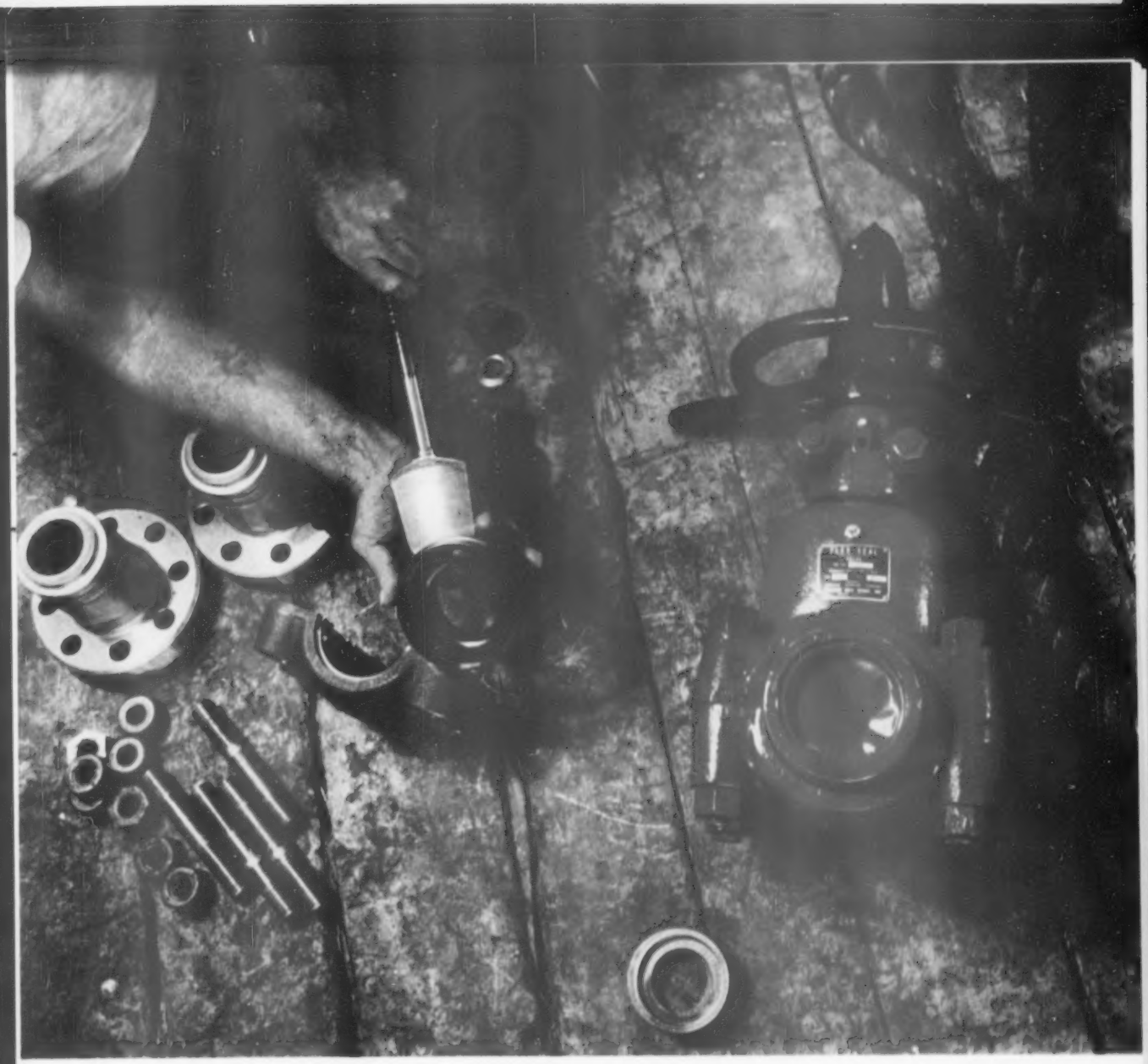


Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY

Largest Exclusive Coupling Manufacturer in the World

WARREN, PENNSYLVANIA, U.S.A.



Originators and largest manufacturers of mud valves

Mention mud valves to anyone, anywhere, in the drilling business —most likely they'll say they use Cameron FLEX-SEALS, the tough valves for abrasive service. The FLEX-SEAL has no thin sections to be damaged by rough handling, no delicate adjustments and the sealing surfaces will take an unbelievable beating. Incidentally, the renewable resilient seat is non-extruding—it is retained by a shoulder on the gate, the only such design available. Naturally, this means longer life and fewer replacements. The exclusive swiveling feature makes it a life-long friend to anyone who has tried to make up a tight manifold with ordinary connections.

Like thousands of other operators, you probably enjoy these advantages now. If not, give FLEX-SEALS a try and see why they are on more rigs than any other mud valve in the world today.

Cameron

IRON WORKS, INC.

P. O. Box 1212 - Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

THIS IS CAMERON'S 35th YEAR OF SERVICE TO THE INDUSTRY

Your children visit a new world each week

Each Thursday, teacher turns a knob and the class enters a new world—a world many are visiting for the first time via the Standard School Broadcast.

Since 1928, this program has introduced man's musical heritage to Western children. Now playing for its second generation, the Standard School Broadcast is probably the biggest "classroom" in history. It has an audience of nearly 1,500,000 listeners throughout the West, Alaska and Hawaii . . . students in 54,000 classrooms and adult listeners at home. They hear a symphony orchestra, a dramatic cast, choral groups and guest artists. Standard provides Teacher's Manuals as program listening guides.

Goal of the School Broadcast is to help listeners gain an absorbing new interest in music, and—through music—a broader knowledge and understanding of the world around them. We suggest that you listen in at home to enjoy the world's best music and to gain one more link with your childrens' interests. TUNE IN every Thursday . . . check your newspapers for time and station.

STANDARD OIL COMPANY OF CALIFORNIA

plans ahead to serve you better

be very glad to get this new crude and won't be eager to sell back any to Earl but will do so if he insists. That's the nature of the business.

Let's suppose Maiger's refining department expands or revamps some of its plants and needs more crude, or a different type from what it has been getting. It dumps the problem in Earl Byers' lap, because he is not only the salesman for the production department but also the crude-purchasing agent for the refining department. The production department gets paid in cash for oil that leaves its lease tanks, and the refining department pays cash for oil that enters its yard tanks, and what happens in between is up to Earl Byers and his crude-oil department.

It may be that during the course of a year the production from Maiger's own wells will total about the same as the volume of crude run by Maiger's refineries. So the company can say that its operations are approximately in balance, even though most of the crude it actually refined was physically produced by other people's wells.

The word "approximately" is used advisedly, because no company could keep its lease production and refinery throughput in exact balance day by day—even if every well were directly connected to its refinery. Both wells and refineries have to shut down for reconditioning now and then, and their production rates fluctuate from time to time. So the crude-oil department has to carry substantial stocks of crude in storage to provide flexibilitiy, and normally is either buying or selling some crude all of the time.

This constant exchanging of crude gives the industry as a whole a flexibility and a stability which it could not have if each company tried to produce and refine only its own oil.

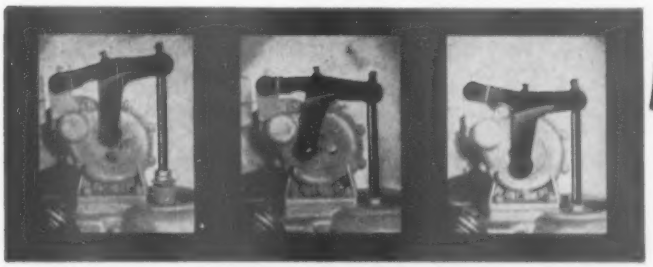
There are also many independent refineries scattered around the country, that is, those that have little or no crude production of their own. They, too, employ crude-oil men whose job it is to purchase the right quantities of the grade of crude desired at the moment and to deliver it at the lowest possible transportation cost. To accomplish this they often have to engage in complicated exchanges and sometimes have to buy a great deal of crude they don't want and then resell it to somebody who can use it.

There are also a few independent crude-oil men, not salaried by any refiner or producer. For the most part they operate in areas where there are no field gathering systems operated by pipelines or where there are no major purchasers. Often these independents operate (or contract with) trucking services to haul oil from remote wells to pipeline points or gathering stations. They normally pay the posted price at the well, but the producer may have to pay back a portion of this to the trucker. A refinery figures the value of a certain crude on the basis of its posted field price, plus the established gathering charge (usually 10 cents per barrel but as low as 5 cents or as high as 12½ cents in some fields), plus the published pipeline rate. If a refinery wants a certain crude badly enough it may agree to pay the trucking costs. If not, the producer will have to pay a trucker to get his oil to a pipeline.

The Free Ride

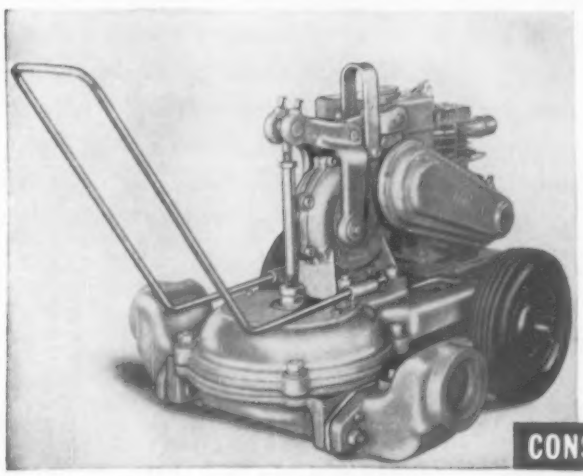
Independent producers who don't operate refineries—even the very large ones—normally don't have any sales department nor give much concern to where their crude goes after some buyer has agreed to take it at the lease. They depend for a market on the free services offered by crude-oil men working for others.

Refiners don't mind giving producers this "free ride." They need the independents and their crude. But in times when crude is in long supply it is a burden for them to keep on taking more and more crude from producers who are always selling and are never in a position to buy back any when a refinery gets in a pinch of oversupply.



Exclusive variable-speed, vertical-stroke plunger design makes this pump outperform, outlast all others!

New CMC SKWEE-GEE Diaphragm Pump



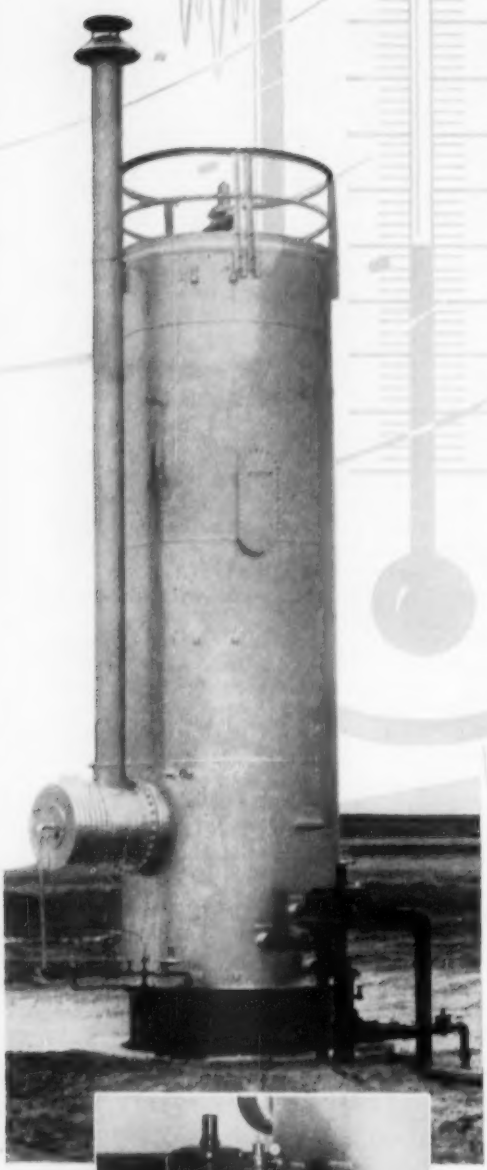
Now a combination 2" and 3" pump that's the best in the business for jobs ranging from de-watering to pumping sludge. Actually the modern successor to cranky diaphragm pumps!

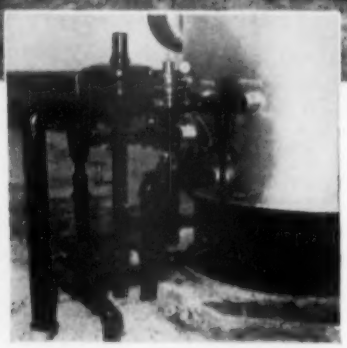
SKWEE-GEE primes dry at 25 feet. Total heads up to 40 feet. Standard plunger stroke 3" with alternate 2¾" by simple adjustment. Lightweight, more compact, easier to move about. Write for Bulletin FD-L3.

Also 1" to 10" DUAL PRIMERS

Get the latest money-saving facts
WRITE FOR
FREE ILLUSTRATED PUMP LITERATURE

CONSTRUCTION MACHINERY CO., Waterloo, Iowa





All connections are grouped closely to the firebox to simplify hook-up and make it easy to house the controls for additional protection against cold weather.

neither snow, sleet nor freezing temperature affects the performance of

PARKERSBURG WINTERIZED TREATERS

Parkersburg engineers outsmarted the weather when they put *all the piping inside* the Parkersburg Winterized Treater — enabling it to withstand lower temperatures longer . . . perform more efficiently in any climate.

Radiation loss is materially reduced because inlet and outlet pipes are inside and rise to the top of the treater. Because the weir box and discharge pipe are inside the treater, discharge water is protected from freezing.

A rearrangement of the fire tube provides increased water capacity with less heat loss to the water. Additional pre-heating of the incoming emulsion takes place as it travels from bottom to top of treater through a pipe in the hot water and oil. All of this adds up to dependable, trouble-free performance of a Parkersburg Winterized Treater in the coldest climates.

• *Let your Parkersburg Representative put your cold climate treater troubles under wraps with a Parkersburg Winterized Treater.*

Parkersburg
RIG AND REEL COMPANY
DIVISION OF PARKERSBURG : AETNA CORPORATION

3345 WINTHROP AVENUE
FORT WORTH 16, TEXAS

5526

Nor do trunk pipeline companies normally solicit crude movements—a fact that may seem odd to the traffic solicitors of railroads and steamship companies. For the most part they, too, depend on crude-oil men employed by others to bring them business. This is one reason why most pipelines are affiliated with companies owning refineries, even though the lines operate as common carriers.

As common carriers, the pipelines do not generally own any crude oil except that necessary for their operations. They normally deduct 1 per cent of what they carry for losses and may sell any not actually used. Occasionally they may buy a relatively small amount of oil to replace that of a shipper which got lost or destroyed while in the line's custody. Occasionally, also, a trunk line may actively solicit traffic when it has empty space in its system, but such solicitations are usually with crude-oil men for other companies.

Some trunk lines jointly owned by a number of major companies have found it necessary to set up agencies which perform some of the functions that would be done by the crude-oil department if the line were owned by a single integrated company. An example is Oil Shippers Service, Inc., subsidiary of Platte Pipeline Co., which acts as a clearing house and accounting agency for crude in transit but does not deal directly with producers nor handle lease division orders.

Other independent pipelines, particularly those which are chiefly gathering systems, do have crude-oil men who operate just like those of the major companies. Many of these systems were originally built to serve a particular refinery, but now act largely as feeders for various trunk lines. In this way they provide new and varied refinery markets for important producing areas.

Taking the Heat

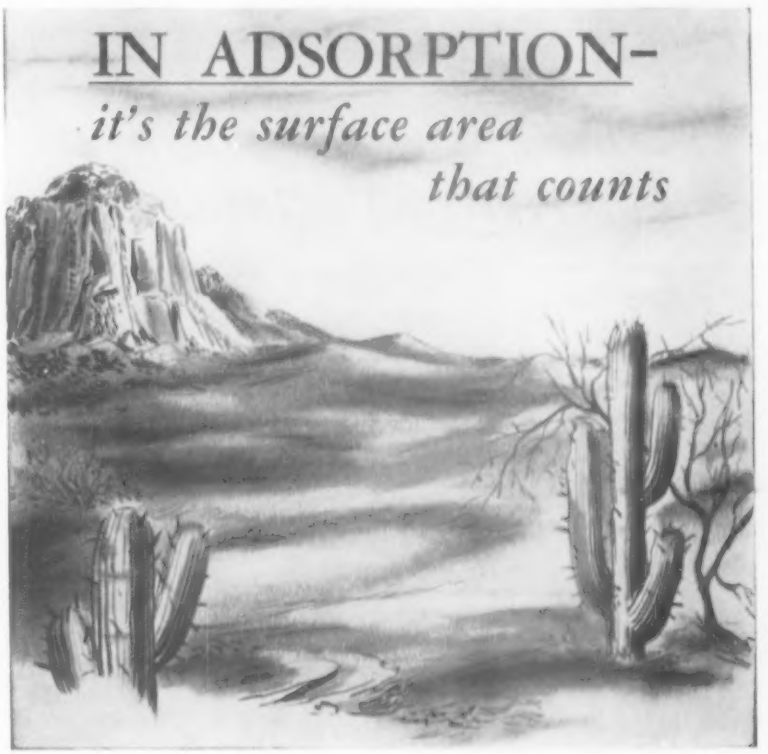
The crude-oil man for a major company is a middleman in more senses than one. He is very much in the middle in his own organization. He is under pressure from the producing department to find a market for more crude; from the refining department to supply a different type or lower cost. The crude-oil man is under pressure from his transportation and supply departments to get the desired type and amount of crude oil, and to get it home to his refinery in the most economical manner.

For this reason, two large majors have set up their crude-oil departments as separate subsidiary corporations. These are Stanolind Oil Purchasing Co. of Standard Oil Co. (Indiana), and Sinclair Crude Oil Co. of Sinclair Oil Corp. Both have headquarters in Tulsa, but operate almost everywhere east of the Rockies.

Such a corporate setup permits the crude-oil men to be free from the control of the other three departments, since they are responsible only to the top management of the parent organization. In other major companies the crude-oil department usually reports directly to top management on an equal status with the other departments. Their problem is to cooperate with and give service to the others without being too much influenced by the current desires of any one of them.

These Stanolind and Sinclair companies are purely service organizations, and are not supposed to show much of a profit. They meet their expenses by charging a service fee (1 or 1½ cents per barrel) on every barrel of crude they deliver to a refinery—whether owned by an affiliated company or an independent. The producer never has to pay a marketing fee, whether he is an independent or part of the parent organization.

Sinclair Crude Oil Co., for example, has about 90 employes, two-thirds of



Dryer than the desert—extremely porous—the multitudinous particles of Florex Fullers Earth possess an adsorptive capacity unequalled by any other known natural material. Consisting of crystals of colloidal size and fibrous shape, Florex assures maximum effectiveness. Florex is so economical that 30 acres of adsorptive surface costs less than a penny.

Florex is particularly superior in the adsorptive refining, decolorization, clarification and neutralization of mineral, vegetable, and animal oils, fats and waxes and for processes involving the use of highly active clay for sweetening light distillates, dehydrations, desulfurization, and polymerization.

Available in all standard particle sizes, special Florex meshes may also be ordered.

Floridin maintains a modern laboratory with highly specialized equipment for the proper evaluation of your adsorption problems. Technical data, samples, quotations, and the services of staff technicians are available upon request.

FLORIDIN COMPANY

Adsorbents
Desiccants
Diluents

Dept. C, Box 998 Tallahassee, Florida

them in the accounting department, but the actual trading is done by only half a dozen of the top men.

Here's What It Takes

The crude-oil departments of other companies operate in essentially the same way, and make similar service charges to both their own and other refineries. However, the actual crude-oil department is often quite small, say from one to a dozen people, and the accounting, legal, and other work is absorbed by other departments.

One major company describes the activities of its crude-oil department as including "negotiation of crude purchase and sale arrangements, issuance of crude-oil price bulletins, scouting and research on industry operations, preparation of short and long-term forecasts of crude supply and demand, preparation of contracts and agreements, coordination of tanker and barge liftings over crude-oil terminals, preparation of nominations to state regulatory bodies, and preparation of various statistical reports that are required by management."

The official titles given crude-oil traders vary from company to company, and some have some pretty fancy designations. They are quite commonly referred to as "buyers," even though many of them are engaged primarily in selling. But they all call themselves "crude-oil men," and are proud of the designation.

It takes a special type of guy to be a crude-oil man. In the first place, he has to be an extrovert, has to like people and like to do favors and ask favors. His success depends on knowing everybody in the business and getting along with them all.

He has to have an elephantlike memory for pipeline locations and tariff rates, for refinery locations and their crude requirements, for posted prices and specifications, and for figures of all kinds.

He has to have a built-in rapid calculator so he can figure the profit or loss on a deal without referring it to the economics department for analysis.

He has to have a trigger-quick ability to make decisions. Things move fast in the crude-oil business, and more often than not an attractive-looking deal won't wait for consultation with the refining department or approval by the board of directors.

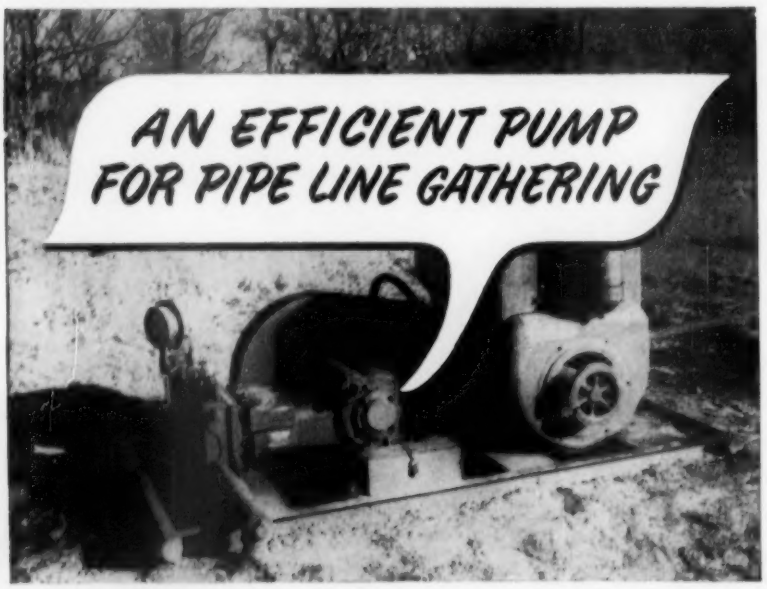
Above all, he has to be a straight shooter. His word must be as good as his bond. Deals are made orally and informally, often over the telephone, and may be in effect for weeks before the lawyers complete the formal contracts.

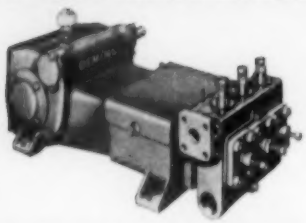
But a crude-oil man must not be a "sharp trader" in the derogatory sense of taking advantage of the other fellow. All of them have to give as many favors as they ask. They always need each other's help, whether crude is in short supply or long. The man who is always asking and never giving, or whose deals are always one-sided in his own favor, won't last long in the crude-oil business. Crude-oil men have long memories. They have a sort of a code that every deal must be beneficial to both parties, and they boast that theirs is one kind of trading where nobody gets the dirty end of the stick.

Traders' Tales

There are exceptions, of course. One of them expressed it this way:

"Crude-oil men must keep a sort of mental set of books with each of the other crude-oil men with whom he trades. It is impossible, as a practical matter, for each deal to be beneficial to both parties. However, through the mental accounts, it is possible and practical—and desirable—to keep the total value of favors received from any company fairly close to the total value of favors done for that company. The man who fails to try to get his mental accounts into balance—on a cumulative basis—when a reasonable opportunity is presented, will soon find fewer





Triplex Pump

Deming Fig. 2993 "OIL-RITE" Triplex Pump shown at left is the unit pictured in the installation view above.

Pipe line gathering is a high pressure job this Deming "OIL-RITE" Pump takes in its stride. You can't top it for trouble-free service. All working parts are fully enclosed, yet easily and quickly accessible. Operation is uniformly steady—practically free from pulsation. Write for details, mentioning Fig. 2993.

THE DEMING COMPANY
559 Broadway • Salem, Ohio

75th ANNIVERSARY DEMING PUMPS 1880 - 1955

DEMING

FOR THE OIL AND GAS INDUSTRY

and fewer of the other men willing to continue favoring him."

To further illustrate this point, another buyer tells this story:

"Once when I suddenly had a batch of crude I had to find a temporary home for in a hurry, I 'phoned the crude buyer of a company I was pretty sure could take it off my hands. This man was away, and I got his young, new assistant. After I explained the deal, this fellow said, 'I can't see any advantage to my company in that. We'd just be doing you a favor.' I was so astonished I simply hung up the 'phone without a word. I finally placed the crude somewhere else.

"A few days later that buyer got home and heard about what had happened. He called me and wanted to square the account by another deal, and for a long time after that he couldn't do enough for me. He knew that sooner or later he would be in a bind and I could help him out, and he didn't want me to think that this young assistant's attitude was his regular policy."

The reason for all this Sir Gallahad stuff is that favors have to be asked and given to keep some operation from shutting down for lack of crude or lack of storage. For example, a refinery or a pipeline may be put out of commission by an accident, or a refinery maintenance shutdown may take longer than scheduled. So somebody has to locate or find a home for a batch of crude in a hurry. The wells keep on producing, but the crude may be routed quite differently for a while.

Now and Then a Grudge

On rare occasions two companies may get crosswise with each other, and months or years later a grudge may be paid off. An example might be a producer who, at a time when crude is short, drops his connections and sells his crude to another buyer who will pay a premium above the posted price. Some time later, in a different field or when crude is long, this same producer wants to sell crude to the company he cut off when he was in the driver's seat, but this company somehow just can't seem to find a home for this particular oil. It works the other way, too. A buyer who gives a producer a raw deal, or isn't interested in his crude when the supply is long, may find that he can't buy new production from this man's leases when the time comes that he really needs more crude.

But except for these really rare incidents, producers and buyers maintain amicable relationships for years on end, through good times and bad. There is very, very little switching of purchasers.

One might think that this crude-oil trading opens the way for a lot of anti-trust skulduggery. Not at all. There is no conspiracy, no restraint of trade, no suppression of competition, no collusion, no under-the-counter dealing. Incidentally, two recent cases, one in the federal courts and one in Texas state courts, have held that crude-oil exchanging is perfectly legal.

Every deal is a straight business transaction between two parties, formalized a day or two later by contracts to buy or sell crude. The deals are usually called "trades" or "exchanges," but actually they are outright purchases and sales. Company A contracts to buy so many barrels of crude from Company B at a certain place, and Company B contracts to buy so many barrels of crude from Company A at a different place. The price is always the posted field price, plus the field gathering charge, plus the applicable published pipeline or barge rate.

Some contracts are for short duration, but usually they are for 1 year and to continue thereafter until canceled by either party. The price is subject to change with any change in the field postings or pipeline rates. Years ago there were long-term contracts to buy and sell crude, but most of these proved disadvantageous to one party or the other. Nowadays both producers and refiners want to stay in a flexible

GLITSCH
LARGE...
OR SMALL . . .
TRAYS
Simple and adaptable in design, GLITSCH "Truss-Type" lightweight trays can be designed for any process requirement with respect to tray size, process layout, type of flow, type and shape of downcomer, weirs, wells, and size and shape bubble caps as well as suitable corrosion resistant materials.
GLITSCH BUBBLE CAPS
Dies for 287 different cap and riser assemblies are now available. The cap styles can be varied further by a wide range of slots. Holddown styles simplify clean-outs, reduce "off-stream" time to a minimum.
Glitsch
FRITZ W. GLITSCH & SONS, INC.
P. O. Box 6227
DALLAS 2, TEXAS
Your engineering staff can effect definite savings in initial designing by utilizing GLITSCH world-wide experience in plans, design and fabrication of tower internals. Cost analyses are available promptly.
SALES OFFICES: New York • Chicago • Cleveland • Houston • Tulsa • Los Angeles

position, so they normally avoid long-term deals.

Many years ago there were local "oil exchanges" operating like the wheat pit, where brokers traded in warehouse receipts or sales contracts for crude oil. But they proved to be a rather clumsy way of filling the economic need for a balance wheel between crude supply and demand.

This led to the universal use of posted field prices for crude. Instead of field prices fluctuating with every change in the demand of the refineries physically connected with a given field, both prices and production rates usually remain quite stable, while local or temporary differences between supply and demand are adjusted by the crude-oil-exchange system.

No Two Alike

Many people may think of crude oil as a homogeneous substance with uniform characteristics and having the same quality and value, and therefore its marketing would seem a relatively simple operation. Actually there is probably no other commodity marketed in huge volume that has more variance in characteristics, quality, or value. This makes the handling of a barrel of crude oil a more complex marketing problem than most commodities present.

For example, it would be highly impractical for pipelines to handle each of the many grades of crude oil separately through trunk-line systems. To do this would require huge investments in additional tankage and lines, and would reduce the total volume which could be moved. Likewise, it would be highly impractical for a refinery to process each grade of crude oil separately because of additional tankage required and loss of productive capacity.

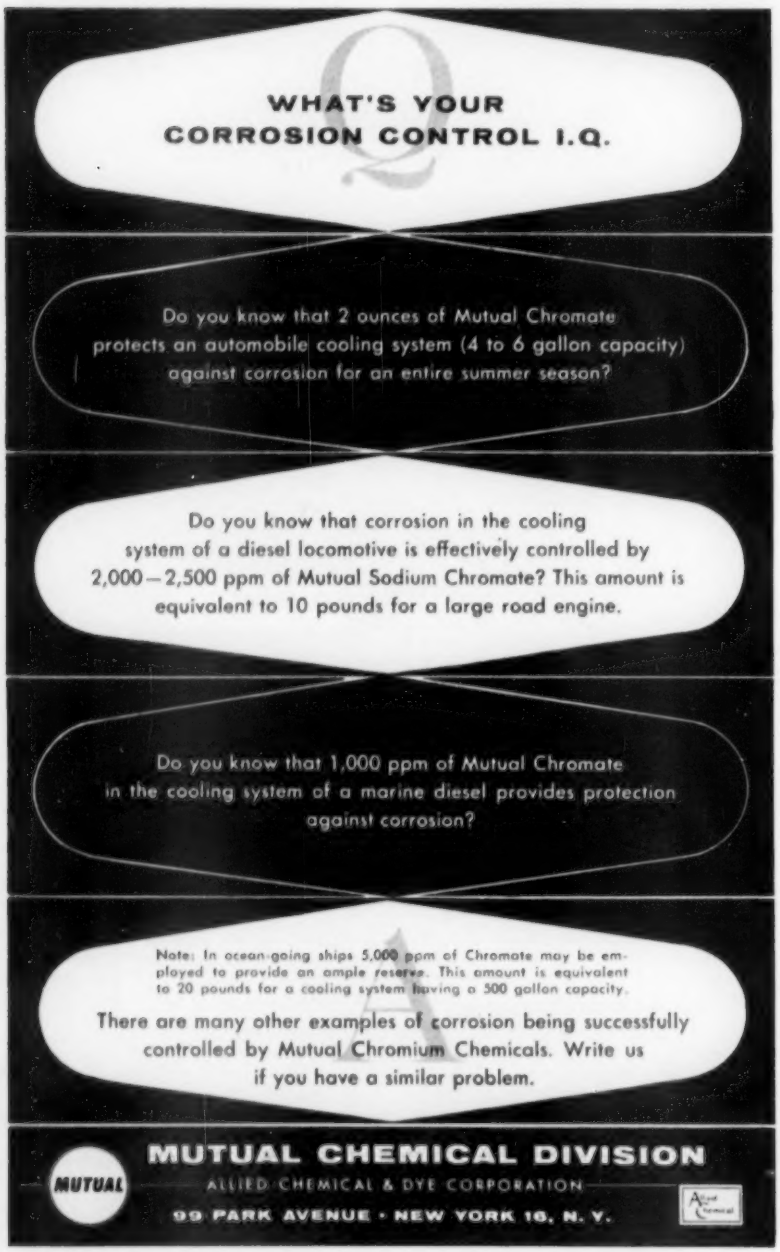
So it is common practice in the industry to segregate and handle separately only those grades of crude that must be processed separately at refineries. It is common practice to mix all crudes having similar characteristics, and these are called "streams." For instance, the "Oklahoma stream" moves to refineries in Illinois and beyond through several pipelines and is sold on the basis of its average gravity, sulfur content, gasoline yield, etc. But no single well feeding this stream may actually produce crude with the identical characteristics of the mixed stream. The posted gravity price schedule reflects to the producer an average value of the whole stream. Crude in the Oklahoma stream is freely exchanged among refineries without any processing difficulties or adjustments, whereas if a refinery dealt directly with individual producers it would have to keep each batch of crude separate and adjust its processes to fit each batch.

When several crudes having similar quality but varying gravities are purchased in the field and ultimately move in a trunk line as a common stream it is necessary that the producer be paid for the particular gravity purchased from him. The common stream will have a different gravity from the field crude purchased from each producer. In order to equalize the gravity, the crude-oil department will often purchase all field crude on the gravity price scale and sell its customer on the basis of the average cost of acquisition.

The War Did It

The business of crude-oil exchanging was slammed into high gear by World War II, when oil was scarce and all refineries had to be kept operating at maximum capacity. The Petroleum Administration for War ordered the industry to get the needed quantities and types of crude to refineries having trouble with supply, so the crude-oil men had to figure out some highly complicated exchanges and pipeline routings in order to comply with the directive.

Before the war forced them to cooperate, crude-oil men were pretty much lone wolves. As one veteran expressed it:


WHAT'S YOUR
CORROSION CONTROL I.Q.
Do you know that 2 ounces of Mutual Chromate protects an automobile cooling system (4 to 6 gallon capacity) against corrosion for an entire summer season?
Do you know that corrosion in the cooling system of a diesel locomotive is effectively controlled by 2,000—2,500 ppm of Mutual Sodium Chromate? This amount is equivalent to 10 pounds for a large road engine.
Do you know that 1,000 ppm of Mutual Chromate in the cooling system of a marine diesel provides protection against corrosion?
Note: In ocean-going ships 5,000 ppm of Chromate may be employed to provide an ample reserve. This amount is equivalent to 20 pounds for a cooling system having a 500 gallon capacity.
There are many other examples of corrosion being successfully controlled by Mutual Chromium Chemicals. Write us if you have a similar problem.
MUTUAL
MUTUAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
99 PARK AVENUE • NEW YORK 16, N. Y.

"In the old days we wouldn't tell each other as much as Gimbel's tells Macy's. Then we learned that the more we exchange information about market conditions the better job we can all do. When we understand the other fellow's problem we very often can work out a trade that helps both of us."

Nowadays crude-oil men are all the best of friends. They maintain a continuous round-robin exchange of information on conditions influencing supply and demand. They have found that this makes things easier for them and benefits the entire industry.

A company's individual position in the industry influences the dominating motives of its crude-oil man.

For instance, consider Will Schwapp, of the N. T. Grated Oil Co. This company refines a great deal more oil than it produces. So Will's number one concern is to supply the refineries with the volumes and types of crudes they want at the lowest possible delivered cost. The refinery managers have supplied him with a big loose-leaf notebook—most of which he has committed to memory—showing just how many cents of manufacturing profit they can squeeze out of a barrel of each type of crude. (Every refinery is different in this respect, depending on its process equipment and its local products market.)

So if Will can trade off a crude that yields a Grated refinery only 28 cents manufacturing profit and get back an equal quantity of crude that will yield 30 cents a barrel, he figures he has earned his pay. Secondary considerations, in Will's case, are to keep the N. T. Grated supply of crude moving, and to find a home for the output of the company's producing department.

On the other hand, Harry Trader has a different problem as manager of the crude-oil department of Whopper Oil Corp. Whopper produces twice as much oil as it refines, so Harry's first responsibility (and biggest headache at the present time) is to find markets for Whopper crude.

It happens that Whopper produces a great deal of crude in an area of the country where it has no refineries, and it also is committed to buy large quantities of additional crude from the leases of other producers—both majors and independents—scattered around in the fields where Whopper is the principal producer. There is no physical way to get most of this crude to any Whopper refinery, so Harry Trader has to do a big selling job.

He tries to prevail on the other majors to buy back at other places as much crude as Whopper is buying from them, but the rest he has to peddle to any refinery—major or independent—that will use it. Harry can figure out the most economical combination of pipeline routes and show a refiner how he can save a cent or two a barrel by using Whopper crude. Of course he has to take back a good deal of crude in exchange, and then he has the additional job of finding a home for that crude, too.

They Post, Too

Crude-oil men set the market price for crude by issuing "Posted Price Bulletins" giving the prices they will pay at the lease tanks. This requires crude-oil men to keep in close touch with supply-and-demand trends at all times, and to know how much of each type of crude the market will absorb at a given time, and at what price. Price changes usually are not made very frequently, but where there are adjustments up or down in any area it is a reflection of the crude buyer's knowledge of competitive market conditions.

Establishing proper prices for crude oil requires knowledge of the value of the various crudes when processed through a refinery, and also knowledge of transportation factors and costs involved in moving the crude to refineries—as well as knowledge of major competitive conditions and supply-demand factors.

16" and 20" HIGH-PRESSURE GAS LINES MODIFIED *in service*

COLORADO INTERSTATE GAS CO.

USES WMSON STOPPLE* TO FACILITATE INSTALLATION OF BLOCK VALVE ON THEIR 20" GAS TRANSMISSION LINE *WITHOUT INTERRUPTION OF GAS SERVICE TO THE CITY OF DENVER*

OPERATORS TURNING CRANK TO LOWER THE STOPPLE* SEALING ELEMENT INTO PIPELINE

MANUFACTURERS LIGHT AND HEAT COMPANY

OF PITTSBURGH, *CONTINUED GAS SERVICE* TO SEVERAL THOUSAND CUSTOMERS IN THE VICINITY OF WHEELING, WEST VA. WHILE INSTALLING A NEW PRESSURE REDUCING STATION ON THEIR 16" GAS TRANSMISSION LINE

*Patent Pending

WRITE FOR *RENTAL-PURCHASE* INFORMATION AND LITERATURE ON WMSON STOPPLES AND WMSON-HILLCO TAPPING MACHINES

T. D. Williamson, Inc.

P O BOX 4038 TULSA 9, OKLAHOMA

REPRESENTATIVES Houston • Pittsburgh • Amarillo • Casper • Provo, Utah • Joliet, Illinois Los Angeles • San Francisco • Bartlesville, Okla. • Edmonton • London, Ontario • Calgary Buenos Aires • Durban, Natal, South Africa

For a crude-oil man to keep his supplies in approximate balance with the demands of the refineries he deals with, he must keep a constant watch on purchases and particularly must maintain his inventories at an efficient level. He maintains these controls by keeping in close and constant contact with all factors affecting the market. He talks with other crude-oil men at every opportunity, and from these and other sources he keeps informed on how the demand for petroleum products may affect the crude-oil market, and about the condition of the industry as a whole.

In states with market-demand proration laws it is the job of the crude-oil man to file with the regulatory commission the nominations to purchase crude on behalf of his company. The total of these nominations is usually the main factor considered by the commission in setting the state's monthly allowables schedule. Because crude buyers maintain close contact with all phases of the industry as well as having knowledge of the over-all supply-demand situation, most state commissions give great weight to the buyers' testimony before making their determinations of the demand for their state's crude.

There aren't a great many people in the crude-oil business, but those few are mighty active. While they do much of their business by telephone, they are out of their offices as much as they are in. Their business is to mingle with other buyers and sellers of crude and see whether the other fellow's problems can be dovetailed into theirs and make a deal that suits both of them.

They run into each other in hotel lobbies, at conventions, at proration hearings, or at coffee counters, and start talking shop. In a few minutes a deal may be made.

"A good crude-oil man has to be out visiting much of the time—talking with people, exchanging information, keeping abreast of market conditions," one of them explains. "During the last few years some of the best deals I have made is when I have been able to get out of town or be in a meeting and thus avoid calls from people to whom we have been selling more crude than we have been buying."

To be effective, a crude-oil man must have a fairly good knowledge of all phases of the oil business, and he is the one man in the workings of the large companies who has intimate contacts with all other divisions of the business. He deals constantly and often with the geologists, the production group, the pipelines, refiners, traffic, marine, treasury, and legal divisions.

It Helps You

This trading—this intangible, little-understood system of crude-oil exchange—benefits the entire industry as well as the companies who pay the salaries of the crude-oil men. Before the system was built up to its present universality, a producer often was dependent on a single purchaser or a single refinery customer. If anything happened to that refiner-customer it might take the producer a long time to arrange another outlet. Also it was a handicap in selling a producing lease if it was tied closely with a single purchaser.

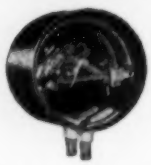
Because of the exchange arrangements a refiner does not need to carry large stocks of crude in storage. A refinery can usually get the quantities and grades of crude needed, at the times they are needed, by judicious exchanges and by reciprocal favors.

The general public, too, benefits from the exchange system. Crude trading virtually eliminates the need to shut down an operation due to a temporary or local lack of balance in supply and demand. Producing wells, pipelines, and refineries can all keep operating continuously because the exchange system takes care of the slack. All this aids in efficiency and in equalizing competitive positions, and the result is lower prices for petroleum products.

YOUR CONTROL PROBLEM IS MERCOID'S PROBLEM

WHEREVER CLOSE AND ACCURATE CONTROL IS REQUIRED FOR PRESSURE, TEMPERATURE, LIQUID LEVEL OR MECHANICAL MOVEMENT, THERE IS A MERCOID CONTROL AVAILABLE FOR THE JOB.

Type PPQ diaphragm differential pressure control operates from minute changes (.03" of water) in the difference between two pressures. Ranges available 6" vac. to 6" press., and 30" vac. to 30" pressure.



Type BB Differential pressure control for high pressures. Opens or closes a switch contact according to a change in the difference between two pressures. Available ranges 60 psi to 2500 psi.

Type DA-21 pressure control opens or closes an electrical circuit upon an increase or decrease of pressure. Can be furnished with many different circuit arrangements. Ranges available 0-14 psi. to 300-2500 psi.

Type DA-35 temperature control opens or closes an electrical circuit upon an increase or decrease of temperature. Various circuit arrangements also available. Ranges from 25-100 F. to 370-530 F.

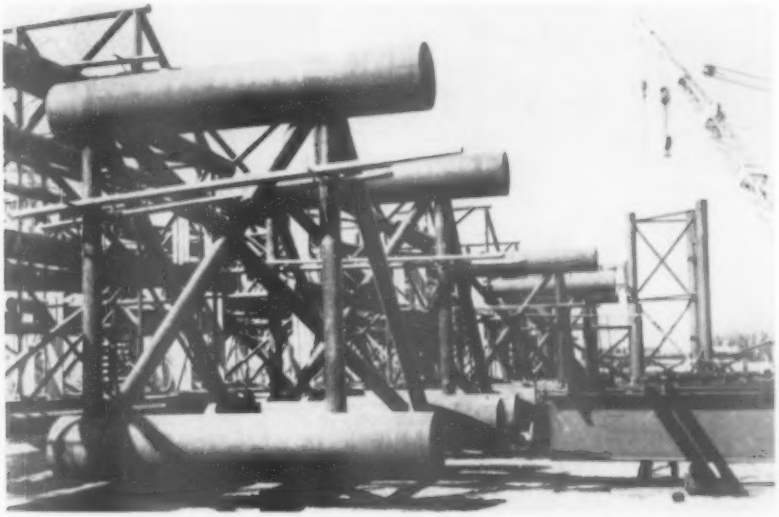
Type DA-400 Series pressure controls incorporate a single bourdon tube which actuates two independently adjustable Mercoid magnet operated mercury switches to accomplish various circuit operations. Ranges 0-30 psi to 300-2500 psi.

Type 76KPE explosion-proof liquid level for pressures to 300 psi. Packless torque tube construction transmits float motion to two Mercoid mercury switches connected in series.

MERCOID CONTROLS ARE AVAILABLE IN EXPLOSION-PROOF OR WEATHER-PROOF ENCLOSURES

For further information write for Bulletin CA

THE MERCOID CORPORATION
4201 BELMONT AVE., CHICAGO 41, ILLINOIS, U.S.A.



WROUGHT-IRON hoods for three-pile dolphins on the offshore platform resist salt-water corrosion. The 33-in. pipe for the structures is made from ½-in. plate. The supports are 10-in. wrought-iron pipe.

Wrought iron beats salt-water corrosion on offshore platform

by A. N. Voripaieff

WHEN Magnolia Petroleum Co. selected wrought iron for protection of its new central separator platform located near Eugene Island, La., they faced up to an operating problem common to all of the offshore producers: salt water corrosion.

For petroleum companies exploring the offshore oil fields of Texas and Louisiana, leases and bonus payments, design and construction of new equipment, and fixed labor costs comprise a large share of the "initial cost" picture. But maintenance of offshore-drilling equipment is recognized as an important influence in keeping operating costs high.

Corrosion from aggressive elements in salt water, salt air, and salt spray constitutes a constant threat to the economical service life of marine platforms and equipment.

Wrought iron's record . . . Magnolia engineers, recognizing the special characteristics of salt-water corrosion, looked to the marine field for a solution to their maintenance problem. A review of wrought iron's performance in marine services prompted the metal's use for the Eugene Island platform.

Evidence of wrought iron's ability to resist corrosion created by a salt-water and salt-air environment is apparent in a variety of existing installations subject to the same set of conditions as offshore structures.

Lighthouses, supported by wrought-iron structural members and built in shallow water on shoals or reefs off the Atlantic Coast, are in good condition after nearly 100 years of service. Pier piping and protection plates are still serving in harbor installations at Boston, New York, and San Francisco after nearly a half-century. Outfall lines, subject to shifting sand and abrasive action as well as salt-water corrosion, have rendered similarly long periods of low-maintenance service.

Production-platform elements . . . Magnolia engineers used almost 150 tons of wrought-iron pipe and plate for those members of the platform most vulnerable to corrosive attack, particularly in the area of a few feet below and above the mean low water, where rubbing by floating equipment is a problem.

For the Eugene Island installation, ½-in. plate was made into 33-in.-o.d. pipe for hoods of three-pile dolphins, and ⅜-in. plate was used for the 18-in.-o.d. pipe on the tops of piles of three-pile clusters.

Wrought-iron pipe, in 10 and 12-in. sizes, is used in diagonal and horizontal bracings for three-pile dolphins and three pile clusters. Horizontal supports for boat landings are made of 4 and 6-in. pipe, with 12-in. pipe used for bumper strips of the boat-landing docks.

Selection of wrought iron for these structural applications represents a substantial saving over the use of expensive alloys or commonly used metals that require special protective coatings.

Other uses . . . With virtually every item of offshore equipment needing a measure of protection against corrosive sea elements, there are many applications—other than those used on the Magnolia installation—where wrought iron might well be considered as a logical and economical choice.

Some suggested services, based on data contained in the engineering service department files of my company, include:

1. Oil casing and oil tubing—where oil-well piping will be subject to the corrosive attack of sea water.
2. Oil piping from wells to offshore platforms.
3. Miscellaneous piping on offshore platforms—where lines are subjected to salt spray and atmosphere.
4. Oil lines from offshore platforms to storage tanks on shore.
5. Hand railings.
6. Electrical conduit and lighting posts.
7. Fuel or water tanks on platforms.
8. Platform decks, smooth or checkered.
9. Pontoons for various services.
10. Service work boats—especially desirable for hulls of work boats subject to scraping and bumping maneuvers that remove protective paint coats in a short period of time.

Wrought iron can also be successfully used for such miscellaneous services as ladders, tie rods, turn buckles, bolts, and nuts.

When the problem of material choice arises in the design of offshore equipment, wrought iron's possibilities are worth reviewing. Its low ultimate maintenance often makes it a logical choice for applications where corrosion can really cost.

Author is manager, marine division, A. M. Byers Co.

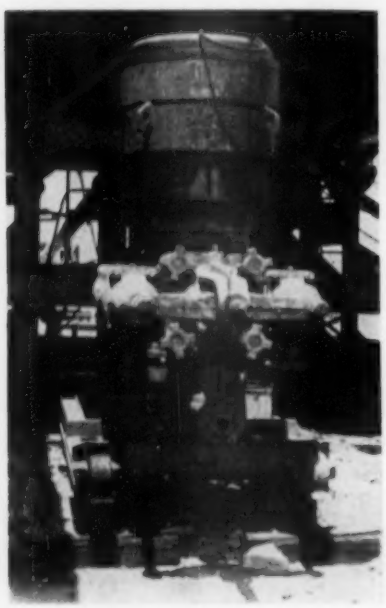
They roll, not drag their blowout preventers

COSTLY equipment is frequently abused in the oil field, but Shell Oil Co. takes care to protect its equipment on its Rig No. 14 operating in Lea County, New Mexico. A typical example is the way blowout preventers are handled on this rig.

Normally after casing is set and the time comes to nipple up the preventers, they are snaked in under the floor with the catline. But without proper care, the preventers can bang around on the substructure and perhaps damage the bonnet or operating mechanism. Or they may drag on the ground and damage or foul the casing-head spool. Also, the heavy preventers can become very dangerous to the crew handling them if they get loose and swing free from the catline.

On this rig, tracks are built right onto the substructure in order to roll the preventers into place. The tracks are made from I-beams. The preventers sit upright on a dolly which rolls on the track. When the preventers are to be nippled up, the beams immediately over the track are taken down and the crew rolls the preventers in over the cellar with pinch bars.

When the preventer assembly reaches the cellar, a line hooked to the elevators is lowered down to pick up the equipment and the dolly is rolled back out of the way. Then the preventers are lowered down onto the casing flange and bolted into place.



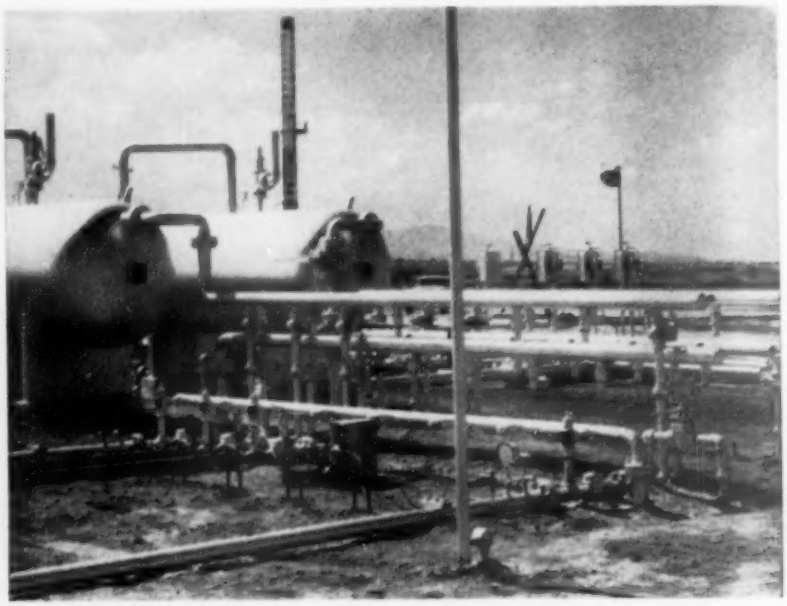


FIG. 1—One section of the trap farm used by Union Oil of California in new Polvadero area.

Well-designed trap farm serves eight wells

THIS well-designed trap farm (Fig. 1) is being used by Union Oil Co. of California to handle the output of its wells in the new Polvadero area of Guijarral Hills field, Fresno County.

The eight-well manifold is arranged so that a well's production can go to: (1) the high-pressure trap; (2) the low-pressure trap; (3) test facilities; or (4) a nearby sump.

Valves, fittings, and traps in the high-pressure system are all of 600-psi. test. To protect them from the higher well pressures should a wrong valve be turned at the well, relief valves are placed in all flow lines. These are set to open at 600 psi. and thereby divert the flow into the blowdown header.

The test facilities are installed on the opposite side of the horizontal separators from the header (Fig. 2). Crude-oil output of any well undergoing test is automatically metered and sampled and its gas production is measured and recorded.

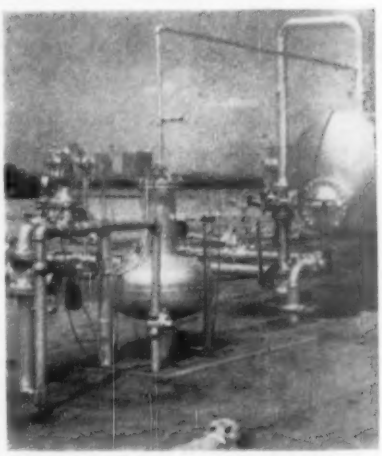


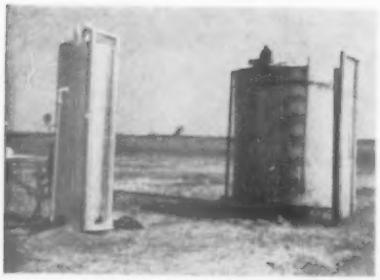
FIG. 2—The trap farm's test facilities.

Testing wildcats with portable separator and tank

WHEN wildcat wells are to be tested, a portable separator and gage tank is frequently used to determine the potential of the well before permanent equipment is installed. These tests are particularly helpful in the case of high gas-oil-ratio or condensate wells.

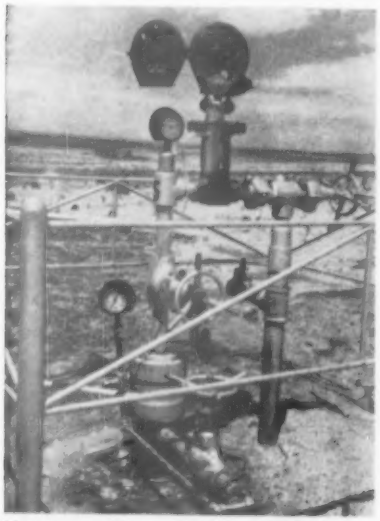
Here is how one company rigs up their testing units to allow them to be easily loaded and unloaded and hauled about without damage. Skids are mounted on both the separator and gage tank.

The separator is 3 by 15 ft., with a frame of 4-in. pipe. Hooks are welded on each side of the frame so that a



winch line can be made fast to "suck" the separator onto a truck.

On the test tank, the skids are held in place by old sucker rods running around the tank. These allow the tank to be lifted by the skids without being strained. The skids prevent the tank from being dinged when raised or lowered over the back of a truck.



Using a time-cycle controller to control gas-oil ratios

IN Adena field of Morgan County, Colorado, the Pure Oil Co. uses a time-cycle controller to control gas-oil ratios. The controller, which is usually found on the input lines of gas-lift wells, serves to operate the motor valve on the flow line of this well.

The controller is set to open the motor valve for a few minutes every half hour or so to pass slugs of oil as they accumulate in the well. Flow of gas is thereby minimized.

Pressure for operating the motor valve is obtained from gas taken from the casing head through a regulator as shown. Some experimenting is first done to determine how the well will produce with different setting times. Then the controller is set to regulate the amount of time the flow-line valve is opened and the length of time between openings so that the well will produce at the lowest gas-oil ratio.

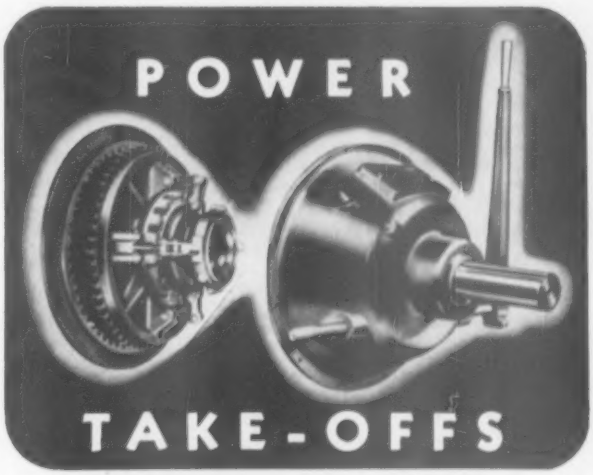
Here's an easier way to take drilling line off a spool

TURNER DRILLING CO. of Mount Pleasant, Mich., uses a simple means of taking the drilling line off a spool and putting it onto the drum of the workover unit.

Instead of putting up standards, they lay the spool flat on the ground on a 2-by-12 plank with stakes driven on either side as shown. A piece of 2-in. pipe is driven into the ground through the center of the spool and a strain taken on the top with a chain to the lease truck.

As the wire line is wound on the rig's drum, friction between the spool

ROCKFORD



ACCURATELY BALANCED

SELF CONTAINED UNIT
WIDE RANGE OF SIZES
CONSERVATIVE RATING
ROLLER BEARINGS
FINE ADJUSTMENT
ACCURATE BALANCE
S.A.E. DIMENSIONS

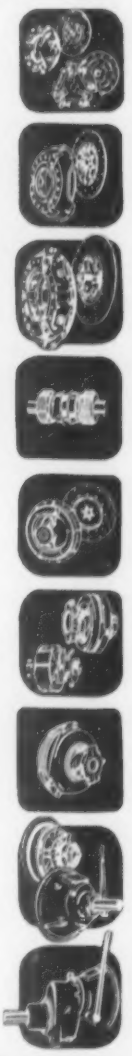
* The clutches used in ROCKFORD POWER TAKE-OFFS are carefully balanced to prevent centrifugal force from affecting efficient operation. A special machine checks the balance of each clutch * within extremely close limits, before it passes final inspection.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

B/W

ROCKFORD CLUTCH DIVISION BORG-WARNER
▲ 1305 18th. Avenue, Rockford, Illinois, U.S.A. ▲



CLUTCHES

and plank maintains just the right strain for tight spooling.

The spool rides the plank tightly during the early spooling when it needs to be tight, and more loosely during the later stages. This prevents the line from running down inside the wraps on the drum.

A new location for a mud-pump surge chamber

ON a drilling rig of Jones, Shelburne & Farmer of Russell, Kans., the mud pump has a built-in surge chamber on the suction side. This is very useful to prevent hammering. Yet the chamber takes up scarcely any room.

Instead of placing the surge chamber on the front of the pump where it would be in the way, the crew has permanently connected it to the side opening of the suction manifold of the pump.

The surge chamber is made from a piece of 6-in. pipe welded shut at one end and cut and welded to form a 90° ell at the other. The latter end is threaded to fit the existing flange on the mud pump.

After a gasket is in place and the surge chamber bolted on, no further work is necessary and the chamber becomes an integral part of the pump.

WHEELING
COUPLINGS
FOR OIL COUNTRY USE
LINE PIPE COUPLINGS A.P.I.
1/8" to 12"—Seamless and Special Processed—Black or Galvanized
PLAIN TUBING COUPLINGS A.P.I.
1" to 4"—Seamless
EXTERNAL UPSET TUBING COUPLINGS A.P.I.
2⅜" to 3½"—Seamless
CASING COUPLINGS A.P.I.
4½" to 13⅜"—Long or Short
HYDRAULIC COUPLINGS
1/8" to 4"—Seamless
REAMED AND DRIFTED A.I.S.I.
¾" to 12"—Seamless or Special Processed
DRIVE PIPE COUPLINGS
⅜" to 12"—Seamless or Special Processed
Sales Offices in Leading Cities
Albany, N. Y.—Albert L. Becker, 434 Clinton Ave.
Baltimore, Md.—Ted Barto, 2301 No. Charles St.
Chicago, Ill.—Harry A. Jay, Suite 1090, Old Colony Bldg.
Denver, Colo.—Earl H. Jones & Co., 1863 Wazee St.
Erie, Pa.—R. J. Maggi, Box 711
Falmouth, Mass.—Walter S. Bennett, 53 Minot St.
Houston, Tex.—Henry H. Paris Distributor, Inc., Box 932
Los Angeles, Calif.—James A. Riordan Co., 1400 Santa Fe Ave.
Milwaukee, Wis.—M. A. Nelson Co., 3347 N. 97th St.
Minneapolis, Minn.—Lin J. Krause, 5605 Lyndale Ave. S.
Norberth, Pa.—J. W. Worthington, 105 Forrest Ave.
Newark, N. J.—Ira L. Rothenberg & Assocs., Industrial Office Bldg., 1060 Broad St.
New York, N. Y.—Max Rothenberg, 11-05 38th Ave., Long Island City
Portland, Ore.—Earl H. Jones & Co., 1233 NW 12th Ave.
Richmond, Va.—P. C. Abbott & Co., 15 E. Franklin St.
St. Louis, Mo.—Mike A. Boyle Co., 1112-18 Hamilton Ave.
San Francisco, Cal.—Earl H. Jones & Co., 1150 Folsom St.
Seattle, Wash.—Earl H. Jones & Co., 819 Thomas St.
TOP QUALITY Since 1918
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
Factories at WHEELING, W. VA. and WOODLAKE, CALIFORNIA

Truck bumper forms base for steel connecting hose

WHERE steel connecting hose must be carried on the well-servicing truck, a safe, convenient place may be found on the truck's bumper. One end of a quick-acting union is welded to the top side of the bumper and the folded-up hose is then attached firmly.

The picture shows the female end of the hose being connected. On the other side of the bumper, the male end of a similar hose is connected. Then the two ends of the hoses are matched and joined.

The joined metal hose makes an additional grill guard for the truck, besides providing a convenient, safe place to carry the hose.

JOB IMPROVEMENT FOR THE PROCESS FOREMAN—30

Here Are Eight Types of Rotary Pumps

VANE pumps consist essentially of the sliding and the swinging or bucket-vane type. Although the majority are designed for constant displacement, there are designs available in the sliding-vane type by which the displacement, and hence the capacity, can be varied while running at constant speed. This is done by incorporating a device that governs the amount of vane movement (see Figs. 1 and 2).

Screw pumps may have one, two, or three rotors with threads of various contours, depending on the design. Figs. 3 and 4 illustrate two screw-type pumps. The majority of two-rotor pumps require timing gears whereas the other types do not. All are of the constant displacement type.

The cam and piston type, Fig. 5, combines the rotary motion of a cam in combination with a piston. Usually two sets are used 180° apart so that a fairly steady flow results. This type of pump is particularly applicable on high vacuum service.

The shuttle-block pump is essentially a piston type pump. It contains a slotted rotor with a pin set eccentric to it in such a way that it will cause the pistons to move in and out as the rotor is turned. By varying the position of the pin, differences in stroke can be obtained and as a result, variable displacement. This pump is shown in Fig. 6.

Multiple piston pumps, Figs. 7 and 8, may be of the radial or axial type. In either, a series of pistons is actuated by a rotor mounted off center in the casing. Pumps of this type have very high volumetric efficiencies and are often used in the hydraulic field. They are particularly well suited where variable displacement is desired.

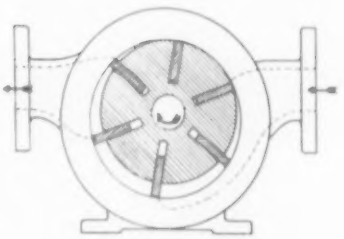


Fig. 1—Sliding-vane pump.

Fig. 2—Swinging-vane pump.

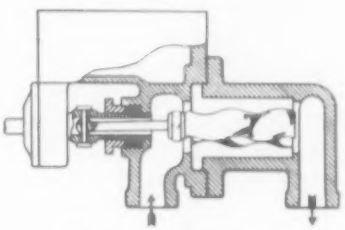


Fig. 3—Single-screw pump.

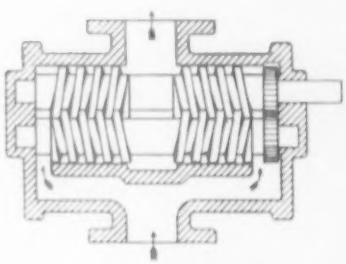


Fig. 4—Two-screw pump.

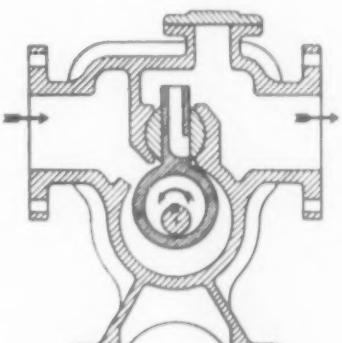


Fig. 5—Cam-and-piston pump

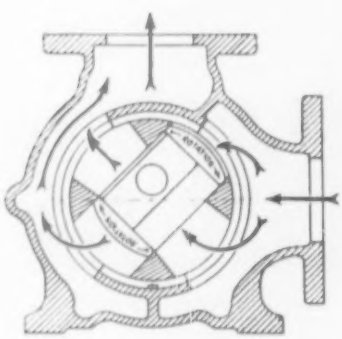


Fig. 6—Shuttle-block pump.

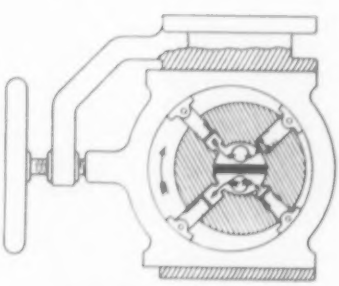


Fig. 7—Radial-plunger pump.

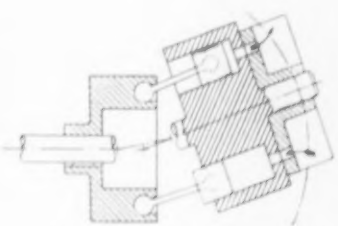


Fig. 8—Axial-plunger pump.

From material prepared by W. J. Mongon, De Laval Steam Turbine Co., Trenton 2, N. J.

THOMPSON *unitized* VACUUM TANKS for *MODERN* Refineries!

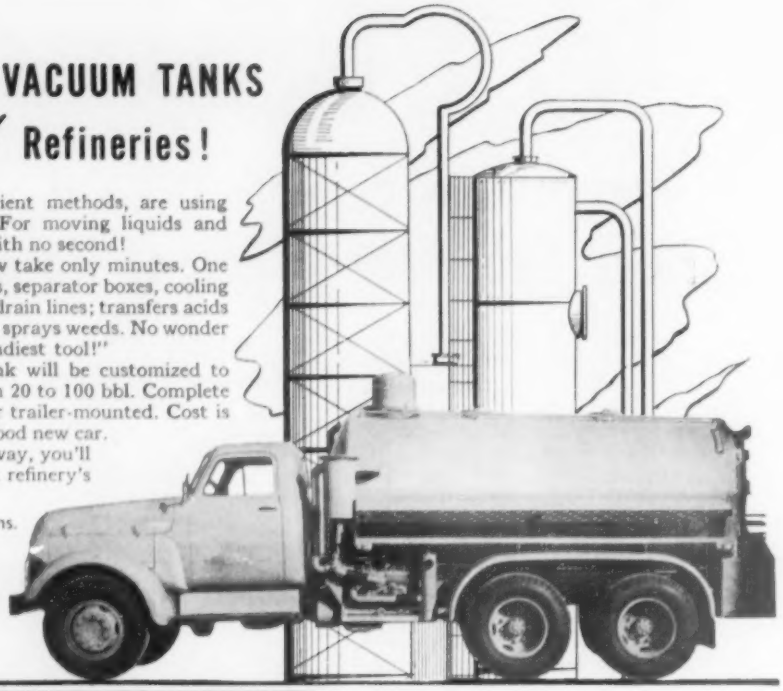
More and more refiners, seeking efficient methods, are using Thompson Unitized Vacuum Tanks. For moving liquids and semi-solids, they're first in the field—with no second!

Jobs which used to require hours now take only minutes. One driver-operator cleans tanks, drainboxes, separator boxes, cooling tower basins, spills, and leaks; unplugs drain lines; transfers acids and caustics; oils roads and tank bunds; sprays weeds. No wonder the Thompson UVT is called "the handiest tool!"

A Thompson Unitized Vacuum Tank will be customized to meet your needs. Capacities range from 20 to 100 bbl. Complete units can be skid, truck, semi-trailer or trailer-mounted. Cost is about what you'd expect to pay for a good new car.

If you are searching for tomorrow's way, you'll want to know more about the modern refinery's handiest tool.

Write today for complete specifications.



This is a 45-bbl. Thompson Unitized Vacuum Tank mounted on a GMC truck. This complete, mobile unit, operated by one man provides speed and economy for a host of liquid and semi-solid handling jobs at the world's most modern refinery.

New Model WT50 now available. A complete unit that can be truck-mounted in your own shop. Write for specifications.

THOMPSON TANK and MANUFACTURING CO. Inc.
2019 EAST WARDLOW RD. LONG BEACH 7, CALIFORNIA

SOLE LICENSEE TO MANUFACTURE VACUUM TANKS UNDER U.S. PATENT NO. 2522077

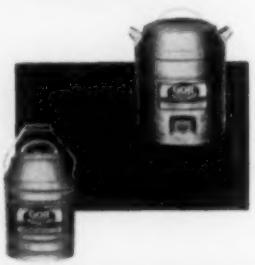
made for rugged use... *in plant—office or field*

Gotkool water cans and coolers

GOTKOOL Water Cans and Coolers are easily portable for field use, and are ideal for use in office, store, and plant. Both **Gotkools** have extra large top openings. Snug-fitting, easily removable top protects drinking water from dust and contamination. Heavy construction with double-locked, sweat-soldered seams. *Buy* **Gotkool** *at your supply store today.*

GOTKOOL Water Cooler – made in 1½-, 2-, 3-, 5-, 10-, 15-, and 20-gallon sizes with either extended or recessed, flush-mounted faucet. *Note:* 15- and 20-gallon sizes available with extended faucet only.

GOTKOOL Water Can – made in 1½-, 2-, 3-, 5-, 10-, 15-, and 20-gallon sizes without faucet.



H. P. GOTT MFG. CO.
WINFIELD, KANSAS

KEEP PURE DRINKING WATER ALWAYS HANDY

1955-56 DIRECTORY OF PLANTS AND PERSONNEL

- CRUDE-OIL REFINERIES
- FIELD-PROCESSING PLANTS
- PETROCHEMICAL PLANTS

This new edition of The Journal's Annual Directory brings you the results of six recent surveys of the processing side of the oil and gas industry. The surveys cover installations in the U. S. and Canada. It brings you the facts.

- A statistical summary arranged alphabetically by state and company which gives you the names, capacities, and processes.
- An alphabetical listing giving plant location for 341 crude-oil refineries, 531 field-processing plants and 260 petrochemical plants.
- In addition to the plant-by-plant surveys you get the names of over 6,500 key executive and operating personnel.

Single copy $15.00
7 or more copies $12.00 each

READER SERVICE DEPARTMENT
THE OIL AND GAS JOURNAL
Box 1260 Tulsa, Oklahoma

by D. H. Silvern

Centrifugal Compressors—2

Calculating Temperature Rise, Efficiency, and Horsepower

COMPRESSORS are designed to produce a given pressure rise from a given inlet pressure and temperature with an expected efficiency. Thus the designer must determine the compressor exit temperature from these factors. This may be done as follows: First the isentropic enthalpy rise is calculated:

$$(\Delta T)_S = T_1\left[\left(\frac{P_2}{P_1}\right)^{\left(\frac{\gamma-1}{\gamma}\right)_{av}} - 1\right]$$

Then the actual enthalpy rise:

$$\Delta h = (\Delta h)_s/\eta$$

And finally from these the temperature rise is obtained:

$$\Delta T = (\Delta T)_s + (\Delta T)_p$$

where

$$(\Delta T)_s = (\Delta h)_s/C_p$$

$$(\Delta T)_p = [\Delta h - (\Delta h)_s]/C_p$$

Example . . . The following information was obtained from the test of a pipeline booster:

$T_1 = 506.2\ ^\circ R$ $\quad T_2 = 547.5\ ^\circ R$

$p_1 = 560$ psia $\quad p_2 = 738.5$ psia

Mass flow = 147 lb. per second

Specific gravity = 0.585 (molecular weight = 16.93)

From Reference 2, Figs. 5 and 6:

$p_c = 674$ $\quad T_c = 357\ ^\circ R$

Then

$$T_{r1} = \frac{506.2}{357} = 1.418 \qquad T_{r2} = \frac{547.5}{357} = 1.533$$

$$p_{r1} = \frac{560}{674} = 0.831 \qquad p_{r2} = \frac{738.5}{674} = 1.095$$

Using Reference 3, Figs. 1-3, and Reference 4, Figs. 1-3:

$Z_1 = 0.90; \quad Z_2 = 0.89; \quad Z_{av} = 0.90$

$C_{p1} = 0.592$ B.t.u./lb. °F.; $C_{p2} = 0.610$ B.t.u./lb. °F.;

$C_{p\,av} = 0.601$ B.t.u./lb. °F.

Reference 1, Fig. 5, then gives the following:

$(R\phi Z)_1 = 2.515; \quad (R\phi Z)_2 = 2.390$

$$[(\gamma-1)/\gamma]_1 = \frac{(R\phi Z)_1}{C_{p1}} = \frac{2.515}{0.592 \times 16.93} = 0.2510$$

$$[(\gamma-1)/\gamma]_2 = \frac{2.390}{0.610 \times 16.93} = 0.2315$$

$$[(\gamma-1)/\gamma]_{av} = 0.2413$$

With the above data the isentropic and actual enthalpy rise is calculated:

$$(\Delta T)_S = T_1\left[\left(\frac{P_2}{P_1}\right)\left(\frac{\gamma-1}{\gamma}\right)_{av-1}\right] = 506.2\left[\left(\frac{738.5}{560}\right)^{.2413} - 1\right] = 35.1\ ^\circ R$$

$$(\Delta T)_p = (\Delta T) - (\Delta T)_s = (547.5) - (506.2) - 35.1 = 6.2^\circ$$

$$C_s = \frac{Z_{av}\,R}{\left(\frac{\gamma-1}{\gamma}\right)_{av}} = \frac{0.9 \times 1545}{(0.2413)(16.93)(778)} = 0.439\ \frac{BTU}{Lb}\ ^\circ R$$

$$(\Delta h)_s = C_s(\Delta T)_s = (0.439)(35.1) = 15.36$$

$$\Delta h = (\Delta h)_s + C_p(\Delta T)_p = 15.36 + (0.601)(6.2) = 19.08$$

And finally the efficiency is determined:

$$\eta_{ad} = \frac{(\Delta h)_s}{\Delta h} = \frac{15.36}{19.08} = 0.805$$

If the efficiency is determined as for an ideal gas, that is based on temperature rise ratio, it is found to be equal to 0.85 or about 5 per cent too high.

In determining the isentropic enthalpy rise, it was assumed that the value of Z and $[(\gamma-1)/\gamma]$ was the same at the end of the isentropic compression and at the end of the actual compression. While this is not

Author is chief, analysis section, turbine engineering department, Continental Aeration & Engineering Corp., Detroit. Method developed by author while at Clark Brothers Co., Inc. The first installment of this article appeared in the August 29, 1955, issue, pp. 113-114. This is the final installment.

quite true, a check of these values at the end of the isentropic compression shows a negligible error due to this assumption. This might not be true for higher-pressure-ratio compressors and therefore a second calculation using the results of a first such approximation might be necessary.

In order to obtain the hydraulic efficiency:

$$\frac{n-1}{n} = \frac{\log (T_2/T_1)}{\log (p_2/p_1)} = \frac{\log (547.5/506.2)}{\log (738.5/560)} = 0.282$$

$$\eta_H = \frac{Z_{av}\, R\, \Delta T}{(n-1)/n} \times \frac{1}{\Delta h} = \frac{(0.9)\,(1{,}545)\,(41.6)}{(0.282)\,(16.93)\,(778)}$$

$$\times \frac{1}{19.08} = 0.814$$

Using ideal gas methods

$$\eta_H = \frac{(\gamma - 1)/\gamma}{(n-1)/n}$$

this value would be about 0.86 again, 5 per cent high.

The input horsepower to this booster is then:

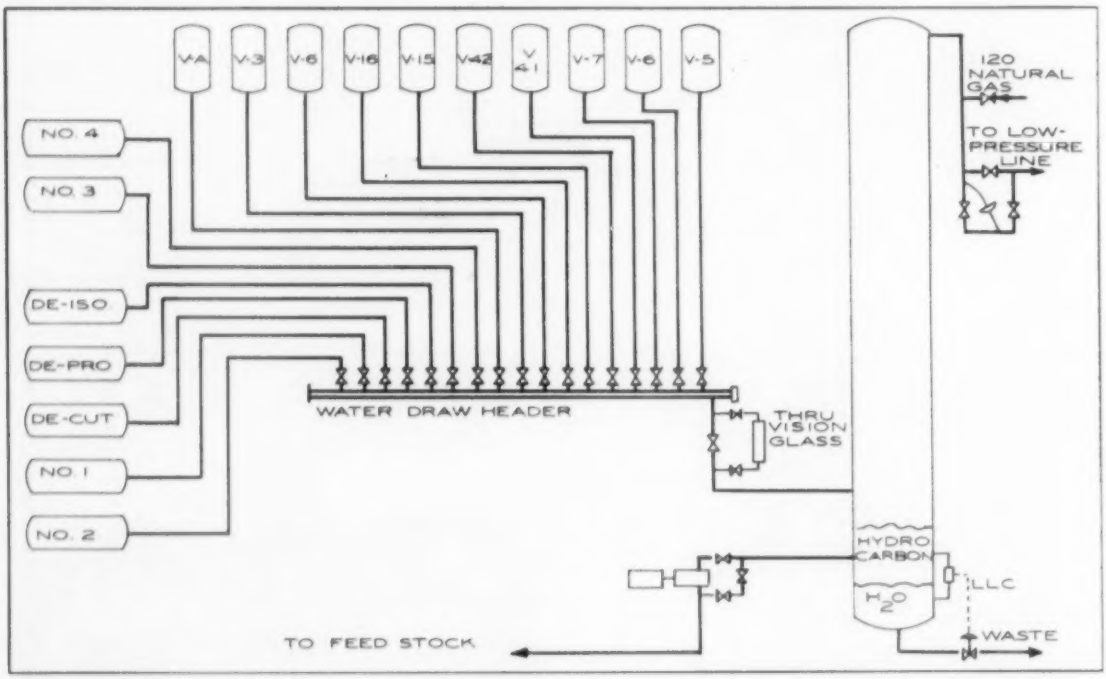
$$\text{Air horsepower} = \text{wt. flow} \times \Delta h\ (778/550)$$

$$= 147 \times 19.08 \times (778/550) = 3{,}970 \text{ hp.}$$

To this figure must be added the bearing losses which amount to about 1 per cent.

References

1. Edmister, Wayne C., McGarry, Richard J., Isentropic Gas Compression, Temperature Exponent and Work Function, Chem. Engr. Progress, 45, p. 421, July 1949.
2. Brown, George Granger, Deviations of Natural Gas from Ideal Gas Laws, Clark Bros. Co. publication.
3. Buthod, Paul, Compressibility Factors of Natural Gas, The Oil and Gas Journal, September 1949, p. 79.
4. Buthod, Paul, Specific Heats of Natural Gas, The Oil and Gas Journal, September 29, 1949, p. 60.



How Sinclair Closed and Centralized Its Water Drawoff

A CLOSED and centralized water-drawoff system is in use at the alkylation plant at Sinclair Refining Co.'s Houston refinery.

The system uses a main-water-draw header to which lines run from the various tanks and vessels in the alky plant. All water plus any hydrocarbons withdrawn from the individual vessels is received at the header, which discharges into a water knockout vessel.

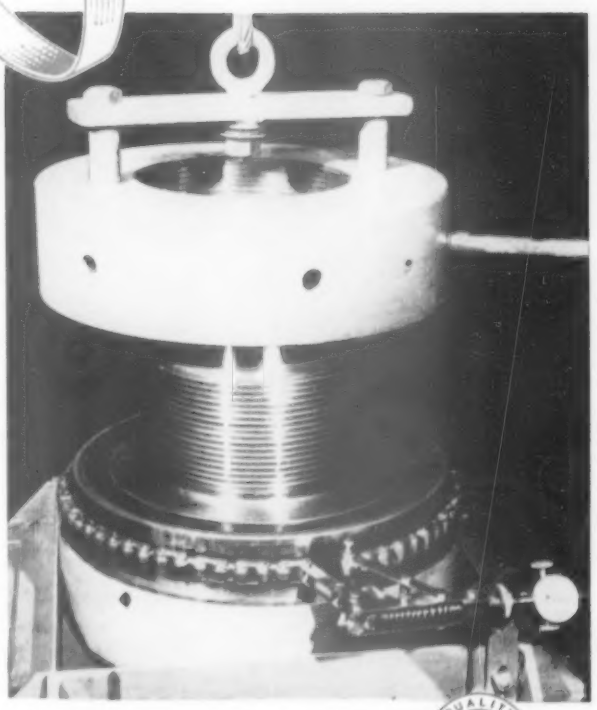
The knockout arrangement is such that a liquid-level controller provides for automatically discharging water to a waste line while liquid hydrocarbons are withdrawn to a feed-stock line to the alky plant. Light hydrocarbons which are recovered in the vessel are withdrawn overhead into a low-pressure gas line which charges them to the absorption plant. A 15-psi. back pressure is maintained in the vessel.

An alternate method is available for withdrawing liquid hydrocarbons. Initially, they may be pumped out. At the same time, a 120-psi. natural gas line is tied in to the knockout vessel. By operating necessary valves, this pressure can be used for forcing the liquid hydrocarbon stream into the feed-stock line.

The method eliminates many hazards which exist when water is drawn off in an open system. Any hydrocarbons or hydrogen sulfide fumes which are carried off may be recovered in the knockout vessel without the danger of their being discharged into the unit limits.

QUALITY and SERVICE

with this ring . . . . I thee wed



OF COURSE the parties involved had been going around together for some time—in fact, ever since they met in the Open Hearth—but it took the "ring test" to finally prove their mettle.

A perfect union of chemical components carefully controlled to make a steel of the required outstanding physical properties necessary to produce Line Pipe worthy of the name "YOUNGSTOWN".

The "ring test", pictured at the right, is the last of many rigorous tests used to prove the quality of Youngstown Electric Weld Line Pipe. A three inch section, or ring, of finished pipe is telescoped over the rubber gasket of the testing machine, and hydraulic pressure applied to determine the TRUE yield strength.

A TRUE test result due to the fact that the physical properties of the specimen ring have not been changed by cold working to flatten. Furthermore, the ring test closely simulates service conditions of installed pipe lines. Yes, final proof of outstanding quality and extended service.

QUALITY YOUNGSTOWN SERVICE

Youngstown ELECTRIC WELD LINE PIPE

THE YOUNGSTOWN SHEET AND TUBE COMPANY Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices Youngstown, Ohio District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

Flexible fins can

E-Z Tubing Swab

. . . and ***Mission E-Z Tubing*** and ***Casing Swabs*** with flexible fins can save a "fish" for you. ***Mission E-Z Swabs*** fall easily through tight or rough spots in casing or tubing. The flexible fins on ***Mission E-Z Swabs*** can't overload, thus practically eliminating line breakage and junk in tubing or casing. This "built-in" overload relief feature, exclusive with ***Mission E-Z Swabs***, eliminates the necessity of purchasing special overload relief valves.

You can select the amount of fluid to be lifted by using one, two or three rubbers. For ***Greater Safety***, ***Better*** and ***Faster Swabbing*** and ***Lower Costs*** operators are standardizing on ***Mission E-Z Tubing*** and ***Casing Swabs***. Like all other ***Mission*** products, these ***E-Z Swabs*** are guaranteed to be more economical than any other swabs you are now using or the entire purchase price will be refunded.

Available through all supply stores—everywhere.

On the down stroke fins are in normal upturned position, allowing E-Z Swab to fall free.

Flexibility of fins allows E-Z Swab to pass smoothly through tight spots on up or down stroke.

When operator tries to pull too much fluid, the Mission E-Z Swab rubber fins bend down and by-pass excess fluid. This safety relief action prevents overloads and broken wire lines.

After overload fluid is passed, fins spring up and seal against tubing.

Nothing but the finest will bear the name of

SLUSH PUMP VALVES • VALVE SPRINGS • VALVE SEAT PULLERS • PISTONS • PISTON RODS

save a fish !

MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS • EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK

LINERS • GLAND PACKINGS • SLIPS • SWABS • CENTRIFUGAL PUMPS • PLUG VALVES

JELFLAKE

Efficient operators stock Jelflake on the job to cut costs of mud circulation losses

It's a wise driller who prepares for emergencies—in advance!

Take, as an example, the operator who unexpectedly encounters a "thief" formation. He saves time . . . and *money* . . . when he has a supply of Jelflake® right on location. Without delay, he puts Jelflake to work to regain circulation quickly and dependably.

Small wonder that Jelflake, the fragmented plastic foil developed by Dowell, is first choice in the field. It's most effective, most efficient and, therefore, most economical. It's most dependable, too, thanks to its unique design. Smaller bits penetrate to plug formation pores; larger fragments flatten out on the surface wall, providing effective protection against further loss of valuable mud or slurry.

A little Jelflake goes a long way. Since fragments are only 1/1000 of an inch thick, one 25-pound bag can seal over half a million square inches of surface. Jelflake will not ball up . . . will not clog equipment either. Stock Jelflake now—on your well locations.

Jelflake is available in strong, wetproof bags at major mud distributors and local Dowell stations. For more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Department K-11.

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

by **W. L. Nelson**
Technical Editor

QUESTIONS ON TECHNOLOGY

How to Test Used Lube Oils

Can you outline a systematic procedure of examining used laboratory oils to obtain the various components thereof?—K.L.G.

This question has appeared frequently, and unfortunately a single series of tests that will meet all needs or purposes cannot be outlined. There are, of course, a number of routine or standard tests that are employed such as tests for gravity, flash point, color, viscosity, saponification number, carbon residue, foaming characteristics, percentage of sulfur, acid number, etc., all of which have been standardized by the A.S.T.M. There are also other tests that are more directly related to used crankcase or lubricating oils, the deposit or sludge found in engine filters, or the solid debris scraped from engines. Some of the A.S.T.M. tests are:

A.S.T.M. D482—Ash (not suitable for volatile metal compounds).

A.S.T.M. D811—Metals in lubricating oils (not suitable for lead, iron or copper).

A.S.T.M. D810—Sulfated residue, lead, iron and copper (but for the entire sulfated residue, not each of the three metals).

A.S.T.M. D893—Pentane and benzene insolubles.

A.S.T.M. D1091—Phosphorus in oils and additives.

In addition, there are numerous accelerated low-temperature oxidation tests directed toward the detection of corrosion or instability. R. G. Larson (Laboratory Evaluation of Oil Deterioration, Analytical Chem., 20, 547, June 1948) lists 15 such tests for engine oils as well as 20 tests directed at other types of oils. These tests pertain mainly to sludging and bearing corrosion, but if conducted at a high temperature (265° C.) they can disclose tendencies toward ring sticking and lacquering.

The three main types of oxidation products may be classified as sludge, acids, and saponifiable substances and in the engine these are associated with carbonaceous material, soot, ash, additive debris, lead from tetraethyl lead, metals from corrosion and wear, etc. Sludge or high-molecular-weight oil and fuel-oxidation products contribute to filter-screen clogging, oil-passage plugging, ring sticking, lacquer deposition, etc. Acids are obviously objectionable and some saponifiable materials (esters, lactones, anhydrides, peroxides, metal soaps) lead to viscosity increase in the oil or may act as catalysts for further oxidation or bearing corrosion.

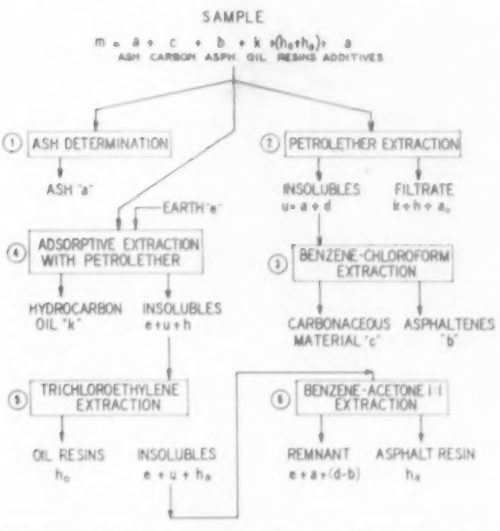


Fig. 1—One laboratory scheme of separating components of used crankcase oil.

It is impossible for this department to recommend any general analysis from all of the available information, but as an illustration Fig. 1 shows the major separation methods used in one investigation (Kadmer & Mauser, A Contribution to the Problem of Piston Blowby . . . Evaluation of Used Crankcase Oils, Fourth World Petroleum Congress, Section VI, Rome, Italy, 1955).

The following symbols are used to designate the different types of materials that are separated:

- m = oil or filter residue samples
- a = ash
- c = carbonaceous or sooty material
- b = asphaltenes
- k = hydrocarbon oil
- h_o = oil resins
- h_a = asphalt resins
- a_a = additives

and at intermediate stages, the following materials:

- u = a + d, petrolether insolubles
- d = c + b, carbonaceous and asphaltic material
- h = h_o + h_a, resins
- e = adsorptive earth treating agent

The operations contemplated in Fig. 1 will be described briefly:

. . . **Operation 1.** Ash may be determined in many ways depending upon which metals, if any, are to be identified.

. . . **Operation 2.** Another sample of the oil or filter is diluted with 20 volumes of petrolether and filtered. The filtrate consisting of oil, resins and usually part of the additives, is discarded.

. . . **Operation 3.** The insoluble portion consisting of ash (a), carbonaceous materials (c), and asphaltenes (b), can be washed and extracted with benzene-chloroform in which the asphaltenes are soluble.

. . . **Operation 4.** Still another sample (10 g.) diluted with 100 ml. of petrolether is shaken for 1 hour with 10 g. of activated earth and then filtered through fritted glass. The filtrate contains substantially nothing by hydrocarbon oil, and the last traces are washed from the filter by 50 ml. of petrolether used in five portions.

. . . **Operation 5.** The insolubles of Operation 4 consisting of adsorptive earth, petrolether insolubles (u), and adsorbed resins (h), is extracted with trichloroethylene for the removal of so-called "oil resins" (h_o) in the filtrate.

. . . **Operation 6.** The remaining insolubles of Operation 5 are extracted with benzene-acetone for the removal of the asphalt-resins (h_a) in the filtrate.

COOPER "420"

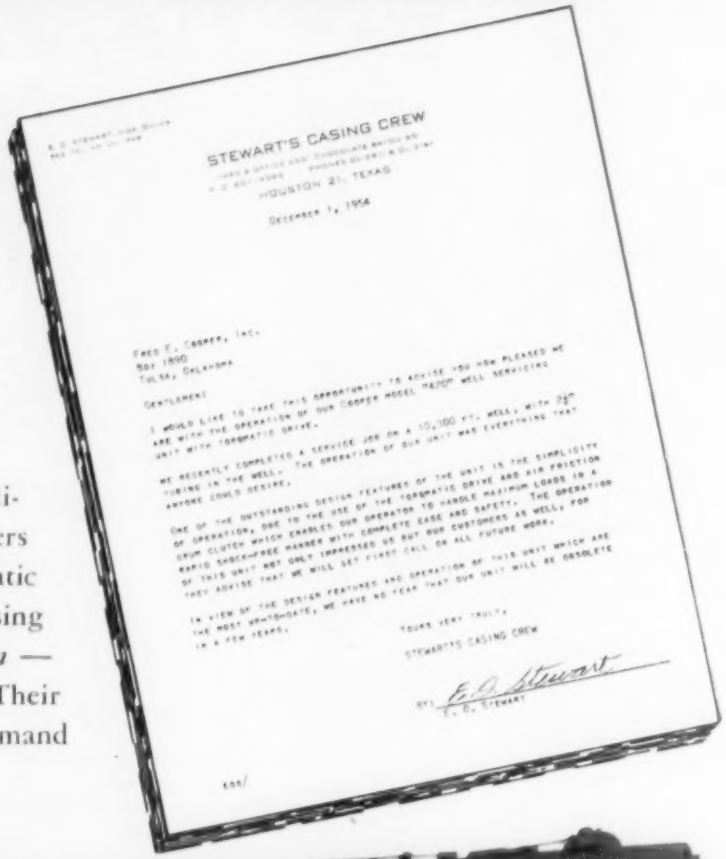
SERVICING and WORKOVER RIGS

WHAT DO THE OPERATORS SAY?

Read what Mr. E. O. Stewart thinks of the COOPER "420".

Stewart's casing crew, a highly successful contracting organization operating in the Houston area, has been in the business many years. They know their business and they know machinery.

This is only one of many complimentary reports received from owners and operators of Cooper Torqmatic Units. Every one of them stressing *Easy, simple shock-free operation — Speed, safety and modern design.* Their customers request and sometimes demand Cooper Torqmatic Drive Rigs.



STEWART'S CASING CREW

HOUSTON 21, TEXAS

December 1, 1958

Fred E. Cooper, Inc.
Box 1890
Tulsa, Oklahoma

Gentlemen:

I would like to take this opportunity to advise you how pleased we are with the operation of our Cooper Model 420D well servicing unit with Torqmatic Drive.

We recently completed a service job on a 10,100 ft., well, with 2⅞" tubing in the well. The operation of our unit was everything that anyone could desire.

One of the outstanding design features of the unit is the simplicity of operation, due to the use of the Torqmatic drive and air friction drum clutch which enables our operator to handle maximum loads in a rapid shock-free manner with complete ease and safety. The operation of this unit not only impressed us but our customers as well, for they advise that we will get first call on all future work.

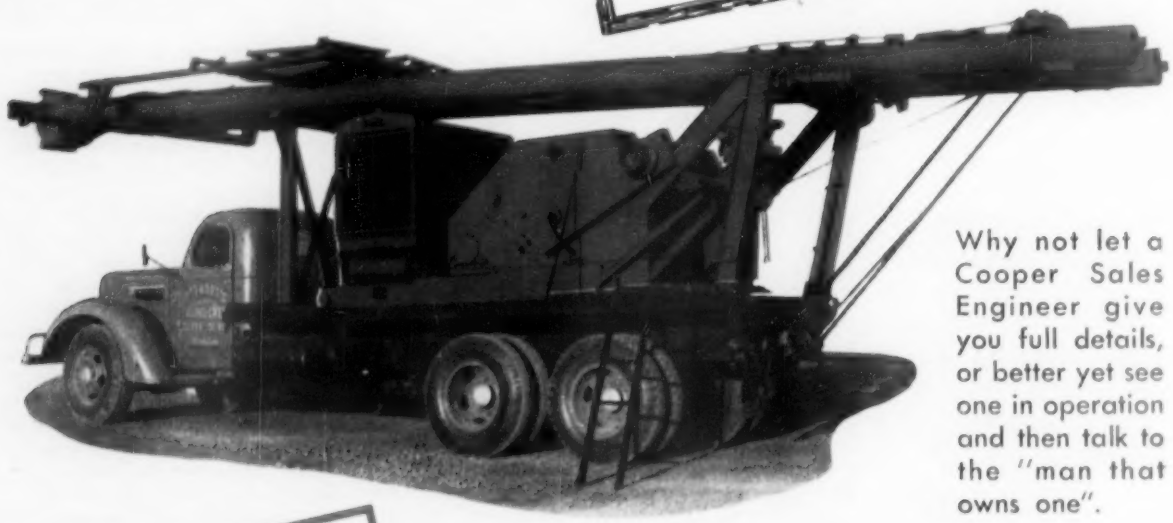
In view of the design features and operation of this unit which are the most up-to-date, we have no fear that our unit will be obsolete in a few years.

Yours very truly,

Stewart's Casing Crew

By: E. O. Stewart
E. O. Stewart

eos/



Why not let a Cooper Sales Engineer give you full details, or better yet see one in operation and then talk to the "man that owns one".

Owners of modern, Torqmatic Drive Rigs get "first call" for those deep wells that require the best of equipment.

FRED E. Cooper, Inc.

P. O. BOX 1890 TULSA, OKLA.

Houston, Odessa, Los Angeles, Olney

Pipeline Patrol

. . . Report on Construction

They Cut Down the Old Pine Tree

Right-of-way clearers on the Texas Eastern Transmission Corp.'s Beaumont, Tex., to Kosciusko, Miss., natural-gas line got plenty of experience in wood chopping. The line went through some of the South's many pine forests which supply the nation with much of its shiplap. In this picture, crewmen of H. C. Price Construction Co., of Bartlesville, Okla., are lining up a length of the 30-in. pipe.

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by • preceding the job.

Crude-Oil Pipelines

• **Big Horn Pipe Line Co.**—Firm has asked Wyoming Public Service Commission for permission to build a 150-mile, 8-in. crude-oil line from Ash Creek field, Wyoming, to a connection with Service Pipe Line Co.'s line at Midwest, Wyo.

Butte Pipe Line Co.—This jointly owned company of Shell Oil Co., Murphy Corp., and Northern Pacific Railroad has let contracts for its $18,000,000 crude-oil line from southeastern Montana to Guernsey, Wyo. Contractors and their spreads are:

Anderson Brothers Corp., Houston, 82 miles of 10-in. and 6½ miles of 12-in. from Glendive to Poplar, Mont.

Associated Pipe Line Contractors, Houston, sections 1 and 2, totaling 227 miles of 16-in. from the Montana-Wyoming state line to Guernsey.

O. R. Burden Construction Corp., Tulsa, 88 miles of 16-in. from Alzada, Mont., to Cabin Creek field near Baker. Company also has 15 miles of 12-in. in this area.

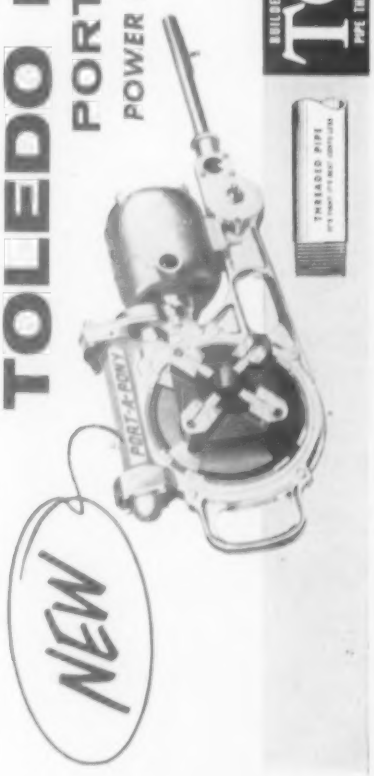
• **Malco Pipeline, Inc.**—Company is planning a 40-mile, 4-in. line from South Blanco Tocito field in Rio Arriba County, New Mexico, to Bloomfield, San Juan County, New Mexico. Completion set for 1955.

• **Pasotex Pipe Line Co.**—Company will substitute 20-in. pipe on 70 miles of its two 8-in. lines from Wink to El Paso, Tex. The project will increase crude-oil deliveries to El Paso by 10,000 bbl. daily. After this job is finished, Pasotex could convert the remaining sections to 20-in. line to make 200,000 bbl. daily available at El Paso. In an emergency, Pasotex could give enough crude to Southern Pacific Pipe Line Co. at El Paso to supply the West Coast until another crude line could be built.

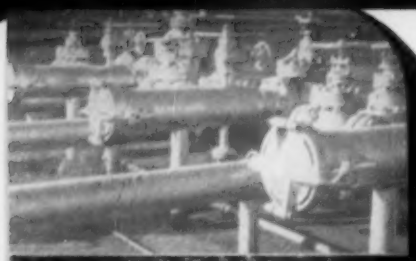
LIGHT • VERSATILE • TIMESAVING

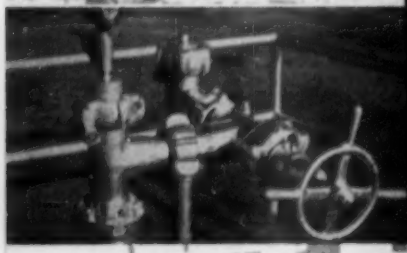
Here's a new tool that's so chock full of uses it is difficult to list all of them. Though originally designed as a means of power to operate pipe threading tools, it is a highly desirable unit for many other uses. For example: Opening and closing large valves, winching operations, pulling wire through conduit, hoisting operations, operating augers, cranking operations. The PORT-A-PONY is a powerful portable power drive that will greatly reduce manual labor. Weighs only 26 pounds. Rugged construction, sturdy reversible ½ H.P. motor. Send today for new colorful bulletin on the "TOLEDO" No. 68 PORT-A-PONY with all applications illustrated. Remember — if it bears the familiar "TOLEDO" label, you know it's a dependable product. Manufactured by Thread-Ezy Mfg. Co., Subsidiary of The Toledo Pipe Threading Machine Company, 1445 Summit Street, Toledo 4, Ohio.

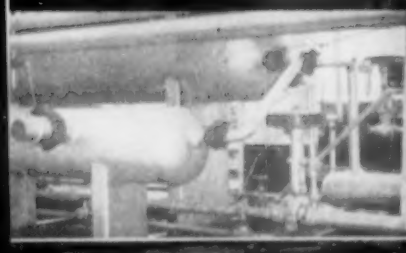
TOLEDO No. 68
PORT-A-PONY
POWER PIPE THREADER
Weighs only 26 lbs.



BUILDERS OF THE WORLD'S FINEST PIPE TOOLS
TOLEDO
PIPE THREADERS • PIPE WRENCHES • PIPE MACHINES







THERE IS ONLY ONE

UNIBOLT

Distinctive features: **Lighter but stronger** — its unique design results in minimum bulk and weight yet places more metal in shear to provide greater strength. **One bolt** — simplifies assembly and disassembly and serves only to draw tapered interlocking shelves together, carrying none of the load of the coupling itself. **Adaptability** — its design readily permits adapting it to numerous fittings, as well as pipe couplings. **Interchangeability** — any part for a given size and type coupling or fitting is interchangeable, permitting minimum warehouse stocks of UNIBOLT products and replacement parts. **Broad field of application** — ALL UNIBOLT products utilize the same basic mechanical design, only the seal rings, or gaskets, differ with the class of service.

THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS

FORCE FEED LUBRICATORS

For operation against discharge pressures of up to 30,000 P.S.I.G.

CHEMICAL FEEDERS

Capacities from .6 pint to 17.5 gallons per hour.

. . . ENGINEERED TO YOUR INDIVIDUAL NEEDS

Manzel

DIVISION OF
HOUDAILLE-HERSHEY CORPORATION
336 Babcock St., Buffalo 10, New York

S. E. HUEY & CO.
ENGINEERS & SURVEYORS
HENINGER BLDG.
MONROE, LA.

SURVEYING & MAPPING

PIPE LINE SURVEYS

COATES Field Service, INC.
P.O. Box 1581 OKLA. CITY

Thoroughly Specialized
RIGHT-OF-WAY PROCUREMENT
From Title Search . . .
. . . To Damage Claims

Pipeline Patrol

Salt Lake Pipe Line Co.—Company plans to build 80 miles of crude line from Rangely, Colo., to Salt Lake City. The firm said that if the job is started this year it would have to be finished in 2 or 3 months. The line will parallel an existing one.

• **Union Oil Co. of California.**—Company proposes to build an 815-mile line from Rifle, Colo., to Los Angeles to carry the products from its proposed Rifle, Colo., shale-oil plant to the Los Angeles refining area. The line would cost approximately $56,000,000.

• **U. S. Defense Department.**—Defense officials are considering a 97-mile, $8,000,000 line from the Elk Hills Naval Reserve in California to the Los Angeles refining area.

• **West Coast Pipeline Co.**—The off-again-on-again plans for this crude line from near Wink in West Texas to near Norwalk in California are presently before the Office of Defense Mobilization. A three-man board of nonindustry members recently recommended that the project be dropped. They questioned the ability of West Texas to produce enough crude to supply both the East and West Coasts in time of war. The three-man board favored building a line from California's Elk Hills Naval Reserve to be held in standby for possible future need.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

• **H. W. Bass & Sons, Inc.**—Company is planning on a 152-mile, 4-6-in. L.P.G. line from Goliad Corp.'s plant in Live Oak County, Texas, to Corpus Christi.

Southern Pacific Pipe Lines, Inc.—Company has completed letting most of the contracts for its 846-mile products line from Los Angeles into Phoenix and El Paso into Phoenix. The contractors are:

. . . Schedule 1—158 miles of 8-in. between El Paso and Lordsburg, N. M., under construction by Morrison-Knudsen Co., Los Angeles, and River Construction Co., Fort Worth.

. . . Schedule 2—145 miles of 8-in. between Lordsburg and Tucson under construction by R. H. Fulton & Co., Lubbock, Tex.

. . . Schedule 3—122 miles of 8-in. and 35 miles of 12-in. from Tucson to Hassayampa, Ariz., contracted by Hood Construction Co., Lynwood, Calif.

. . . Schedule 4—128 miles of 12-in. from Hassayampa to Yuma, Ariz., let to Macco Corp. and Alex Roberson Co., Paramount, Calif.

. . . Schedules 5 and 6—197 miles of 12-in. between Yuma and Colton, Calif., let to Conyes Construction Co., San Pablo, Calif.

. . . Schedule 7—42 miles of 16-in. between Colton and La Habra, Calif., to be laid by J. E. Young Pipeline Contractor, Inc.

. . . Schedule 8—19 miles of 16-in. from La Habra to Watson let to Engineers, Ltd., Pipe Line Co.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost $4,200,000.

Sioux Oil Co.—Company will build a 55-mile products, 8-in. line from its Newcastle, Wyo., refinery to Rapid City, S. D.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport L.P.G. from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has received Federal Power Commission approval to abandon the "Little Inch" gas line and to convert it to products service. The campany will spend $13,000,000 convert

DRINKS UP MOISTURE

Twice As Fast!

Use Sovabead in your dehydrator!

- It nearly doubles dehydrator efficiency.
- Maintains efficiency at temperatures as high as 120°F.
- Provides longer desiccant bed life.
- Eliminates caking, reduces channeling, dusting and pressure drops.

Ask Your Representative About Sovabead

Process Products

MOBIL
Process Products
SOCONY MOBIL OIL COMPANY, INC.
26 Broadway, New York 4, N. Y., and Affiliates:
MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.
Formerly Socony-Vacuum Oil Company, Inc.

Pipeline Patrol

ing the line back to products. When finished the line will have a capacity of 235,000 bbl. daily.

Non-Petroleum Pipelines

American Gilsonite Co.—Company has announced plans for a 100-mile pipeline from near Bonanza, Utah, to a proposed gilsonite refinery in western Colorado. The company, owned by Barber Oil Corp. and Standard Oil Co. of California, plans to make gasoline and coke by refining gilsonite. The gilsonite would be moved in a slurry.

Pittsburgh Consolidation Coal Co.—This firm has announced plans for the first pipeline to move coal. The line will be 108 miles of 10-in. from the company's Georgetown mines in eastern Ohio to Cleveland Electric Illuminating Co.'s Eastlake power plant northeast of Cleveland. Construction will start this fall. Ford, Bacon & Davis, Inc., will issue specifications, let contracts, and supervise the construction work. Williams Bros. has contract.

Natural-Gas Pipelines

• **Alabama-Tennessee Natural Gas Co.**—Company has proposal before FPC to lay 21 miles of 12-in. line west from its present line in Colbert County, Alabama.

American Louisiana Pipe Line Co.—Company has let bulk of its 1,121-mile line from North Tepetate, La., to Detroit. Only a 22-in. spur from Payne, Ind., to Bridgman, Mich., is still not awarded. H. C. Price Co., Bartlesville, Okla., has 783 miles of 30-in. pipe. One section will work south from the Hancock-Henry County line and the other will work north from Slaughters, Ky. Brown & Root has 221 miles of 30-in. from North Tepetate to the Louisiana-Arkansas border, and 39 miles of 16-in. line to be built under water. The firm has subcontracted the 221 miles to Associated Pipe Line Contractors and Western Contractors. It will lay the under-water line itself.

• **Niagara Mohawk Power Corp.**—Company plans no major transmission lines for 1955. However, it plans to add more than 300 miles of distribution mains.

• **Northern Natural Gas Co.**—Company plans to spend $32,000,000 to add 348 miles of main line and 307 miles of branch lines in Wisconsin, Minnesota, South Dakota, and Iowa. The application is before the FPC now. The main lines include 169 miles in the Duluth-Superior area and 164 miles in the Aberdeen area of South Dakota.

• **Pacific Gas & Electric Co.**—Company's long-range plans call for looping the Topock-Milpitas line with 135 miles of 34-in. The major part of the line will be laid in 1956, while 62 miles will be laid in 1957.

Pacific Northwest Pipe Line Corp.—Firm has let the initial contracts of its 1,446 miles gas line from the San Juan basin to Bellingham, Wash. The first contracts total $11,236,000. Contractors and their sections are:

River Construction Co., two sections totalling 150 miles of 26-in. between Ignacio, Colo., and Moab, Utah.

R. H. Fulton Co., two sections totalling 160 miles of 26-in. between Moab and Jensen, Utah.

Associated Pipeline Contractors, Inc., one section of 77.6 miles of 26-in. between Jensen and Green River, Wyo.

A. J. Curtis Construction Co., one section of 82.8 miles of 22-in. from Green River to Sage, Wyo.

B & M Construction Corp., one section of 90 miles of 22-in. between Sage and Lava Hot Springs, Idaho.

Midwestern Constructors, Inc., one section of 95 miles of 22-in. from Hot Springs to Burley, Idaho.

H. B. Zachry Co., San Antonio, sections

• **Carolina Natural Gas Corp.**—185 miles 8-12-in., proposed lateral lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

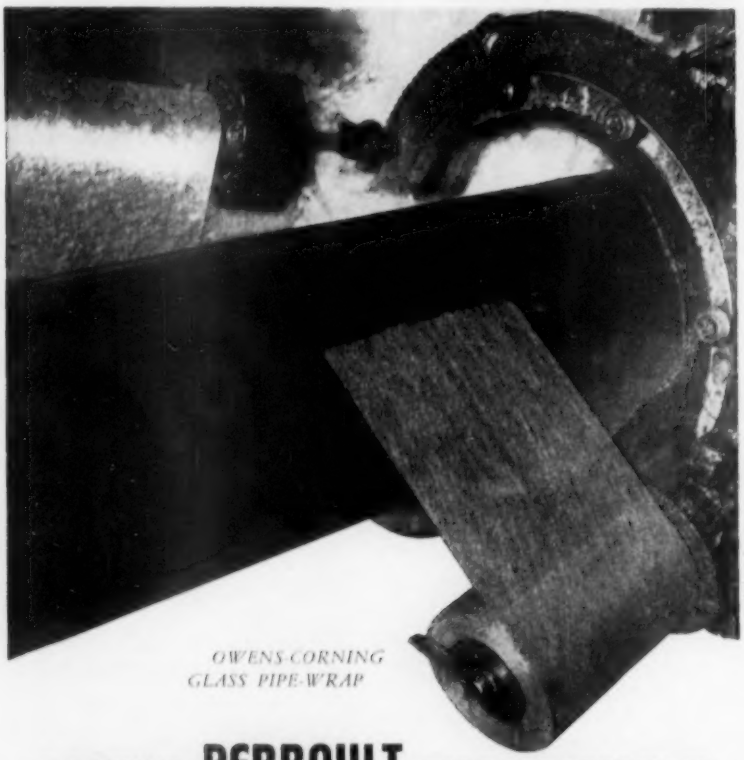
• **Cities of Clarendon and Marvell, Ark.**—Cities have filed for FPC permission to interconnect their facilities with Texas Gas Corp.'s line south of Helena, Ark. The cities will build 53 miles of 4, 5, and 6-in. line to transport the gas.

Cities Service Gas Co.—R. H. Fulton & Co. is laying 93 miles of 26-in. between Blackwell, Okla., and Independence, Kans. for the company. Completion scheduled for December 1. The company also proposes to build a 145-mile gathering system in Woods County, Oklahoma, and Barber County, Kansas. The two jobs will cost $8,422,400.

• Company has FPC authority to remove 41 miles of line and to construct 39 miles as replacement in Newton, Lawrence, Lafayette, and Johnson counties, Missouri, and Johnson County, Kansas. The project will cost $1,685,000.

• **Coastal Transmission Co.**—Company plans to build 550 miles of 30-in. line from near McAllen in South Texas to near Baton Rouge (See Houston, Texas Gas & Oil Co.)

Colorado Interstate Gas Co.—Company has let first part of its 380-mile, 22-in. line from Rock Springs, Wyo., to Denver to Houston Contracting Co. The construction firm is working on 140 miles from near Laramie, Wyo., to Denver. About 65 miles completed by September 1. Associated Pipe Line Contractors will lay the other 240 miles next spring. The line will pick up gas from Pacific Northwest to Rock Springs, Wyo.



OWENS-CORNING GLASS PIPE-WRAP

POSITIVE PERRAULT PIPE PROTECTION

Owens-Corning Fiberglas Coromat pipeline wrap is available through Perrault Equipment Co. in average thicknesses of .020 and .025 in.; in widths from two to 18 in.; and roll lengths of 400, 800, and 1200 ft. High strength and porosity combined with inert reaction to weather, chemicals and electricity make this the best pipeline coating reinforcement. For the best service, get it from Perrault Equipment Co.

ALSO: Asbestos Pipeline Felt • Pipeline Kraft Wrap • Rock Shield

AND FOR DEPENDABLE APPLICATION: Perrault Line Travelling, Over-the-ditch, Coating and Wrapping Machines and Yard or Railhead Stationary Coating and Wrapping Machines.

ALSO: Cleaning and Priming Machines • Tar-Heating Kettles • Beveling Machines • Digging Teeth • Tongs • Welding Clamps • Line-Up Clamps • General Pipeline Hand Tools and Supplies . . .

"EVERYTHING FOR THE PIPELINER"

PERRAULT Equipment COMPANY

W. O. DIXON, Sole Owner

TELEPHONE LUther 5-1103 • 1130 NORTH BOSTON • TULSA 6, OKLAHOMA

EXPORT OFFICE: SUITE 1655, 45 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

WATSON-STILLMAN FORGED STEEL FITTINGS FOR: *Safe, Tight Connections* in pressure piping

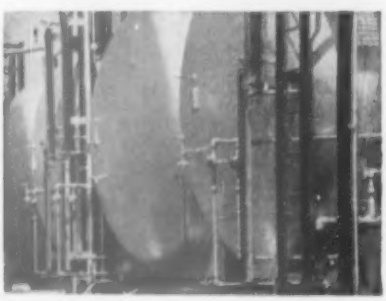
■ In high pressure steam lines... process liquid and gas piping... hydraulic fluid lines... wherever strong, tough pipe joints are needed. Watson Stillman Forged Steel Fittings provide a safety factor against costly piping failures. They resist pressure, heat, corrosion, shock and vibration because they're drop-forged of high quality steel to produce a dense, tough, forged-fiber structure that can really take it.

Extra strength is built into W-S fittings in other ways too... such as the heavy reinforcing bands extending well beyond the threads or sockets.

Protect your high pressure piping system with Watson-Stillman Forged Steel Fittings. Available in carbon, stainless and alloy steels, in Screw-End and Socket-Welding Types to meet your service requirements. Send today for Free Catalogs.

Bulletin A3-50—Forged Steel Fittings
Bulletin S-1-55—Stainless and Alloy Fittings
Bulletin U-1—Forged Steel Unions
Bulletin S-3-55—150 lb. Stainless Fittings

Sold Through Leading Distributors



• *Process Liquid and Gas Piping*

• *High Pressure Lines*

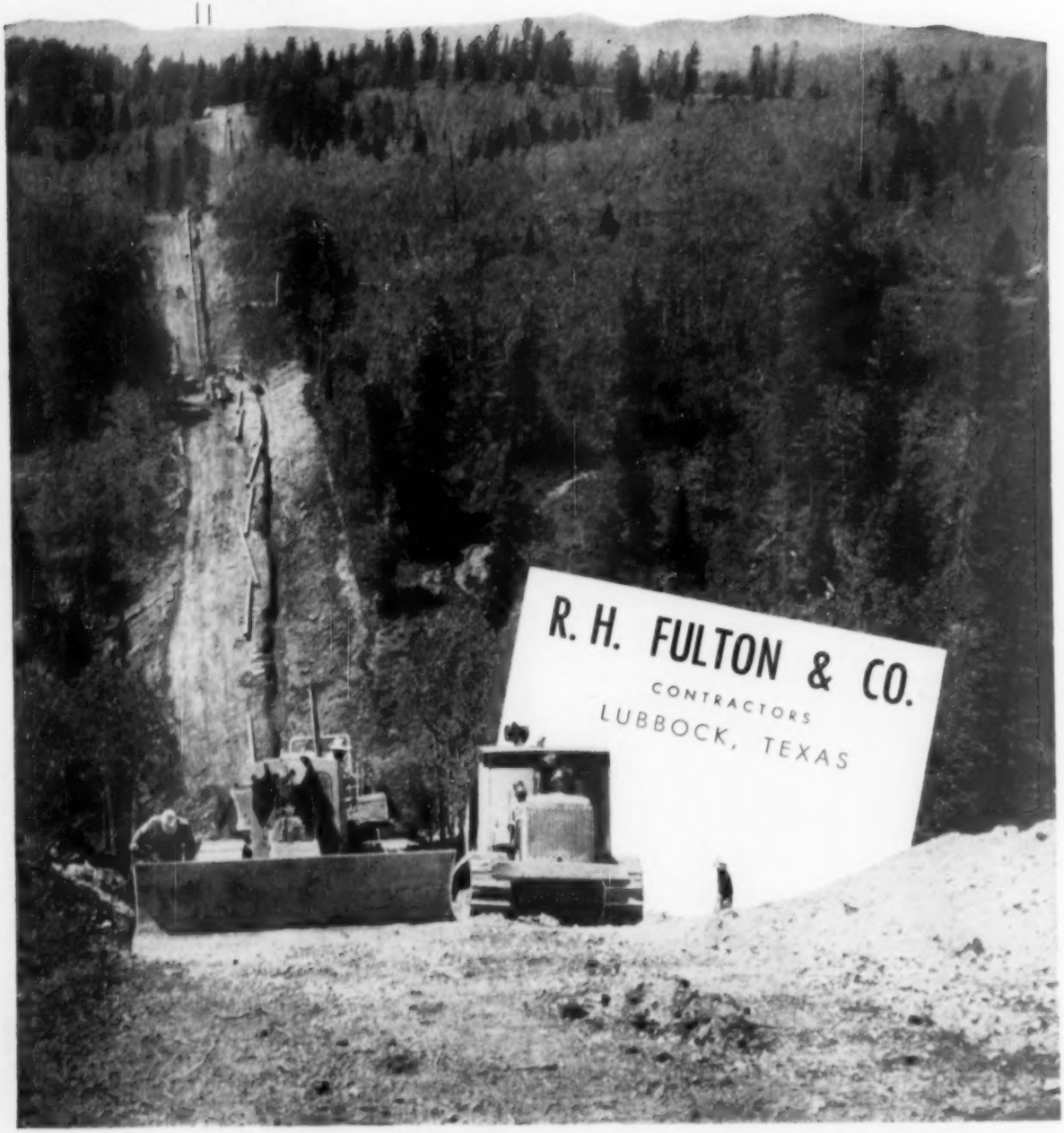
WATSON-STILLMAN FITTINGS DIVISION

HKP H. K. Porter Company, Inc.
Roselle, N. J.

PIPELINES

. . . ACROSS THE CONTINENT!

PRODUCTS PIPELINES
OIL LINES
WATER PIPELINES
RIVER CROSSINGS
GAS PIPELINE CONSTRUCTION



Pipeline Patrol

Colorado Interstate Gas Co.—Company is also spending $4,200,000 extending its gathering lines in the Panhandle of Texas, Oklahoma, and Kansas. Work will be done this summer.

• **El Paso Natural Gas Co.**—Company plans to increase its delivery to California. Most likely way is to loop its existing 500-mile, 30-in. line from the San Juan basin. The FPC has practically killed El Paso's chances of importing Canadian gas.

Firm also has FPC approval for 62 miles of 14-in. line from the Tex-Harvey plant in Midland County, Texas, to gas plant in Jameson County.

Gas Service Co.—Company is spending $216,000 building a 14-mile, 12-in. gas line from Kansas City to the new Mid-Continent International Airport there.

• **Houston Texas Gas & Oil Co.**—Company has applied to FPC for permission to lay a 960-mile gas line between Baton Rouge and Miami. The main line would consist of 507 miles of 30-in., 157 miles of 26-in., 61 miles of 20-in., 224 miles of 18-in., and 12 miles of 12-in. Company also plans 500 miles of sales laterals in Florida. Main line would join with Coastal Transmission's proposed line from McAllen to Baton Rouge.

• **Kentucky West Virginia Gas Co.**—Firm has FPC permission to construct 32 miles of line to connect with a line to be built by Clinchfield Coal Corp. near Osborne Gap, Ky. The line will extend to Kentucky West Virginia's existing system near Maytown, Ky. The Clinchfield job will cost $785,000. The Kentucky West Virginia work will cost $1,455,000.

• **Lone Star Gas Co.**—Company has two plans up before FPC to enlarge its system in Texas and Oklahoma. One is for an $18,000,000, 230-mile line from Cotton County, Oklahoma, to Fritch, Tex. The other plan is for a 205-mile line from Snyder, Tex., to a hookup with the Cotton-Fritch line. The company hopes to prevent Natural Gas Pipeline Co. of America from building its line from Wise County, Texas, to Fritch (see below).

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

Michigan Gas Storage Co.—Bechtel Corp. has contract to build 36 miles of 16-in. line from Mount Pleasant Junction to Milwaukee, Mich. The line will cost $2,500,000. Bechtel has set October 15 as completion date.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in loops. Majority will be in Wisconsin.

• **Montana-Dakota Utilities Co.**—Company has FPC authority to construct 44 miles of pipeline and 1,090 hp. in compressor capacity on its system in South Dakota and Wyoming. Estimated cost would be $1,414,218.

• **Natural Gas Storage Co. of Illinois**—Company now has FPC authority to build 31 miles of 36-in. line from its storage field in Kankakee and Iroquois counties, Illinois, to a connection with Texas Illinois Natural Gas Pipeline Co.'s line where it crosses the Illinois River.

• **Natural Gas Pipeline Co. of America**—Company now before FPC on plans to build 350 miles of 20 and 26-in. line from Wise County, East Texas, to its station 111 at Fritch, Tex.

Nevada Natural Gas Co.—Company plans looping program along its 114-mile line from Needles, Calif., to Las Vegas, Nev. Mileage and size are unknown but cost will be about $2,500,000.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, Va.

9 and 10, 214 miles of 22-in. between Burley and Payette, Idaho.

Fulghum Construction Co., Harrisburg, Pa., sections 11 and 12, 198 miles of 22-in. between Payette and the Columbia River at the Oregon-Washington border.

A. J. Curtis Construction Co., Casper, section 26, 54 miles of 16-in. laterals and 31 miles of gathering-system lines from a point on the main line near Kemmerer, Wyo., to Big Piney field, Wyoming.

R. H. Fulton, Lubbock, section 27, 43 miles of lateral lines and 16 miles of gathering lines from Rangely, Colo., to Piceance Creek field, Colorado.

• **Panhandle Eastern Pipe Line Co.**—Company has plans to loop Peoria lateral before FPC now. The line would be 16-in. pipe running 58 miles from near Springfield to Peoria, Ill.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design, estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Southern Natural Gas Co.**—Company has temporary FPC authority to build 39 miles of loop lines and add 4,950 hp. to its compressor power near Atlanta, Ga. Job will cost about $2,000,000.

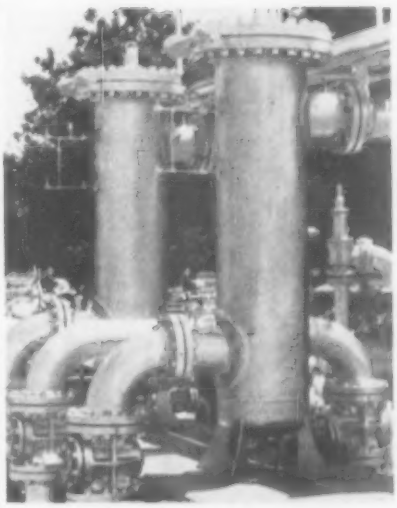
Texas Eastern Transmission Co.—Company has received FPC permission to begin converting its Little Inch line from natural gas to products service. Company has also proposed to Mobilization Director Arthur S. Flemming that the Government give it accelerated amortization on money to invest to put the Big Inch line on standby product service. The company's program is:

MOORLANE

GAS SCRUBBERS

AN ESSENTIAL ACCESSORY

FOR ALL GAS PIPE LINE SYSTEMS



Sizes available are 4-inch through 18-inch diameter vessels for any working pressure.

•

Capacity — up to 34,000,000 standard cubic feet per day.

•

Scrubber is dry type. No oil carry-over to worry about.

•

Filter medium is wool felt.

•

Removes all particles 5 microns (.0002″) in size, and larger.

•

Efficiency remains constant from very low flows to extremely high volumes.

•

Low initial cost.

•

Inexpensive to operate and maintain.

WRITE FOR YOUR COPY OF BULLETIN NO. 457 FOR DESCRIPTION AND PRICES

MOORLANE COMPANY

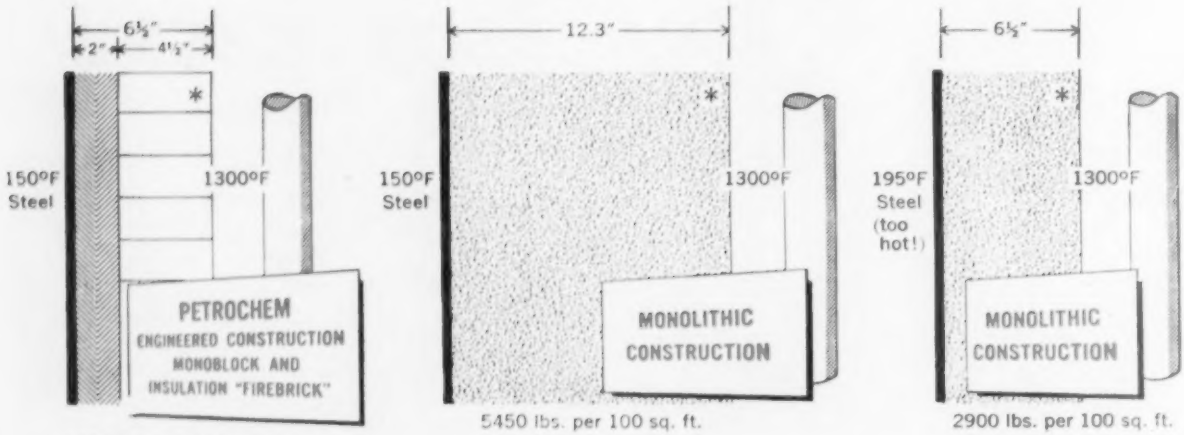
409 EAST ARCHER

TULSA 1, OKLAHOMA

In furnaces as in processes compare the design to judge the advantages

As an example:

The wall construction of all Petrochem-Isoflow Furnaces is designed for 150°F maximum outside shell temperature.



1250 lbs. per 100 sq. ft.

5450 lbs. per 100 sq. ft.

2900 lbs. per 100 sq. ft.

*Based on B & W values.

The Petro-Chem design provides a thoroughly engineered wall construction. It is built with two tiers of monoblock supported on 18 inch centers and a circular arched wall of insulating firebrick. The inside of the steel shell is protected from the possibility of corrosion by a one-eighth inch thickness of Staylastic cement. This type of construction, independently supported monoblock and the circular arch of firebrick, bonded with Smoothset mortar, assures optimum efficiency and minimum maintenance.

The use of monoblock and insulating firebrick laid as a circular arch provides many advantages over a one-piece monolithic lining, including:

1—Low weight, 2—Low heat conductivity, 3—High hot crushing strength, 4—Low expansion coefficient, 5—Resilient compressible backing, 6—Long life, 7—Nil maintenance.

Also, this construction has low heat storage capacity, speeds both heating and cooling. Its light weight requires less concrete foundations and steel supports.

Compare and your judgment will affirm
Petrochem-Isoflow Furnaces are Most Efficient by any Comparison

PETROCHEM-ISOFLOW FURNACES

UNLIMITED IN SIZE . . . CAPACITY . . . DUTY

PETRO-CHEM DEVELOPMENT CO., INC. • 122 EAST 42nd St., New York 17, N. Y.

REPRESENTATIVES: Rawson & Co., *Houston* • Wm. H. Mason Co., *Tulsa* • Lester Oberholtz, *Los Angeles* • Faville-Levally, *Chicago* • D. D. Foster, *Pittsburgh* • Turbex, *Philadelphia* • Flagg, Brackett & Durgin, *Boston*

International Licensees and Representatives: SETEA—S.A. Commercial, Industrial, y de Estudios Tecnicos, Buenos Aires, Argentine • Industrial Proveedora, Caracas, Venezuela • Firma Dr. C. Otto & Comp. G.M.B.H., Germany • Birwelco Ltd., Birmingham, England • Societe Anonyme Heurtey, Paris, France • Societe Anonyme Belge, Liege, Belgium • Huertey Italiana S.P.A., Milan, Italy

Pipeline Patrol

. . . To convert the Little Inch to products with a capacity of 235,000 bbl. daily and to install enough standby pumping equipment to hike the capacity to 375,000 bbl. daily if needed.

. . . To install standby pumping equipment along the Big Inch that would allow the line to be converted from gas to products in an emergency. The line would have a capacity of 425,000 bbl. daily.

Company has recently finished a 382-mile, 30-in. line from Beaumont, Tex., to Kosciusko, Miss. Firm also is considering importing Mexican gas and building a 400-mile line from the border into Beaumont.

Texas Gas Transmission Corp.—Company has big building program set to start soon and end approximately November 1.

From Covington, Ky., to Jefferstown, Ky., company will build 77 miles of 26-in. H. C. Price Co.

Company will loop 14 miles of 20-in. at Haughton, La. Houston Contracting Co.

Will build 72 miles of 12-in. from Hardinsburg, Ky., to Bedford, Ind. Also will build 5 miles of 8-in. near Bedford. H. C. Price.

From Bastrop, La., to Clarkedale, Miss., the company will lay 50 miles of 30-in. H. C. Price.

From Eunice, La., to Morgan City, La., the firm will lay 105 miles of 20-in. H. C. Price.

• Company has also filed with the FPC for permission to add 198 miles of line and an additional 20,270 hp. in compressor capacity along the route of its system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Indiana. The project will cost $20,000,000.

• **Texas-Ohio Gas Co.**—Company proposes to build two systems, one from the Houston-Lake Charles area to Miami, Fla., and the other in the Carolinas and Georgia. Neither idea is before the FPC yet.

Transok Pipe Line Co.—Company has let contract to Pipe Line Service Co., Seminole, Okla., to lay a 140-mile, 24-in. line from Garvin County, Oklahoma, to Tulsa. The firm will also build a gathering system in the Bradley, West Lindsay, and Northwest Purdy fields.

• **Trunkline Gas Co.**—Firm has applied to FPC for authority to build eight new compressor stations and 24 miles of pipeline on its transmission system to enable it to sell additional gas to Panhandle Eastern Pipe Line Co. Total capacity of the new stations would be 56,000 hp. Total cost would be $18,700,000, including $1,000,000 for gathering facilities in the Gulf Coast area. Panhandle filed for 1,600 hp. additional compressor capacity to cost $3,714,000.

• **United Gas Pipe Line Co.**—Company has now received FPC authority to construct 63 miles of 16 and 20-in. natural-gas line in Mississippi, Alabama, and Florida. The company will also add 330 hp. to its compressor stations. Cost for the job will be about $8,300,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not yet let.

• **Wilcox Trend Gathering System, Inc.**—This subsidiary of Texas Eastern Transmission Corp. has received FPC permission to increase the capacity of its system to about 200,000 M.c.f. daily. The company will lay 16 miles of 16-in. and add 4,200 hp. in new additional compressors.

Foreign Crude-Oil Pipelines

• **Cremona Pipe Line Co.**—Firm has announced plans for a 60-mile crude-oil line from the Westward Ho-Sundre area to Calgary.

• **Esso, A. G.**—West Germany affilate of Standard Oil Co. (N. J.) plans line from North Sea port to Rhur-Rhine area. This will probably be 120-mile, 10-in. from Rotterdam to Cologne, the latter rumored as the site of a new 58,000-bbl. refinery to be built by the company.

Peace River Oil Pipe Line Co., Ltd.—Fulton-Banister, Ltd., has contract for 106-mile line from Sturgeon Lake field in Northwest Alberta to the Edson pumping station of Trans Mountain Oil Pipe Line Co., Ltd. The project includes 41 miles of 16-in. and 65 miles of 12-in. Completion is set for December.

Pembina Pipe Line, Ltd.—Company has let approximately 400 miles of gathering lines in Pembina field to Hupp, Ltd. Work began last year and will be completed in November 1955.

• **Pembina Pipe Lines, Ltd.**—Company has announced proposal to build crude-oil line from Sundre-Westward Ho area of Alberta into Edmonton. Two other companies, Cremona Pipe Line Co. and Rangeland Pipeline Co. also have plans for moving the area's crude.

• **Rangeland Pipe Line Co.**—Subsidiary of Hudson's Bay Oil & Gas Co. has made proposal to build line out of Sundre-Westward Ho area to connect with a line of Texaco Exploration Co. and then go to connections with Trans Mountain and Interprovincial.

• **S & M Pipeline, Ltd., and Westspur Pipeline Co.**—Former company is a subsidiray of Canadian Devonian Petroleums, Ltd., and proposes to build a 100-mile crude line from southeastern Saskatchewan to the Interprovincial Pipeline Co. line of Cromer, Man. Westspur, a subsidiary of Imperial Oil, Ltd., proposes to build the same line. Another

NEW WILLIAMS LOCKING ADJUSTABLE WRENCH

THE ONLY REAL ADJUSTABLE WRENCH IMPROVEMENT IN OVER 40 YEARS!

WITH FEATURES YOU HAVE ALWAYS WANTED IN AN ADJUSTABLE WRENCH

- No Obstructions
- Structurally Sound
- Positive Lock
- Rapid Adjustment
- One Hand Operation
- No Fumbling
- Drop-Forged from Selected Alloy steel and Chrome Plated

AVAILABLE IN FOUR MOST POPULAR SIZES

No.	Size	Capacity	List Price
6L	6"	¾	$2.06
8L	8"	1 5/16	$2.45
10L	10"	1 5/8	$3.10
12L	12"	1 15/16	$4.50

J. H. WILLIAMS & CO., 411 Vulcan St., Buffalo 7, N. Y.

WILLIAMS INDUSTRIAL TOOLS "The Broadest Line of Its Kind"

You get fastest delivery at lowest cost through your nearby supply store.

WRITE FOR CATALOG 302
It includes the latest patterns and sizes from which to choose.

CARBON AND ALLOY STEEL WRENCHES • DETACHABLE SOCKETS AND DRIVERS • INDUSTRIAL IMPACT SOCKETS • TOOL HOLDERS • CUTTER BITS • LATHE DOGS • SET-UP TOOLS • "C" CLAMPS • THUMB NUTS AND SCREWS • HOIST HOOKS • EYE BOLTS • MACHINE HANDLES • ROD ENDS • CHAIN PIPE TONGS AND VISES • FLANGE-JACKS • PLIERS SCREW DRIVERS • HAMMERS • GEAR PULLERS • EXTRACTORS

Pipeline Patrol

company, Trans Prairie Pipe Lines, Ltd., also is seeking a permit to build a similar line.

• **Standard - Vacuum Oil Co.** — Company has long-range plans for a 90-mile pipeline to give the new Lirik field in Central Sumatra an outlet. Completion is not scheduled before 1957 or 1958.

Yacimientos Petroliferos Fiscales Boliviano —Williams Brothers has contract to build a 230-mile, 6-in. products line from Cochabamba-Oruro-La Paz. The line will cost approximately $7,000,000. The Bolivian Government will eventually add a 10-in. products line from Oruro to Arica, Chile.

Foreign Products Pipelines

• **Iraq Petroleum Co., Ltd.**—Company is making plans to lay a 75-mile, 24-in. products line from Homs, Syria, to Tripoli, Lebanon. The line would have a capacity of 180,000 bbl. daily.

• **National Fuel Oil Co.**—This company in Israel is a shareholder in a company which plans to build a products line between Haifa and Tel Aviv. The plans call for a 55-mile 6-in. line in which the Government would own 10 per cent.

• **National Iranian Oil Co.** — Company plans $32,300,000, 573-mile, 10-in. products pipeline from Ahwaz to Teheran, Iran. The line will have a capacity of 40,000 bbl. daily. Costain-John Brown, Ltd., London, will build the 337-mile southern part. Entrepose, Paris, will build the northern 236 miles.

• **North Atlantic Treaty Organization (NATO).**—This defense organization is building products lines to airforce bases in various parts of France. Approximately 2,000 miles of 4-in. line will be laid.

NATO—Associated Pipeline Contractors, Inc., Houston, is laying 450 miles of products line from Iskenderun, Turkey, to Batman, also in Turkey.

Overland Pipeline Corp.—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000 from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

• **Sinclair Oil Corp.**—Company is considering a 240-mile crude-oil line from its San Silvestre field in the state of Barinas, Venezuela, to Puerto Cabello on the Caribbean Sea coast. The line would cost $25,000,000.

U. S. Defense Department.—U. S. Defense Department is sponsoring a 485-mile, 8, 10, 12-in. products line from Cadiz to Zaragoza, Spain. The contract has been let to Merritt Chapman & Scott; Benson & Montin of Oklahoma City; and Agroman Construction Co., a Spanish firm. Brown-Raymond-Walsh is the prime contractor. Cost of the line will be approximately $5,000,000.

Winnipeg & Central Gas Co.—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D., plant and move it to Winnipeg. Size and route of the line has not been definitely established.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering contracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd., for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhuliar field to Rawalpindi in West Pakaistan.

• **Empresa Nacional del Petroleo.** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

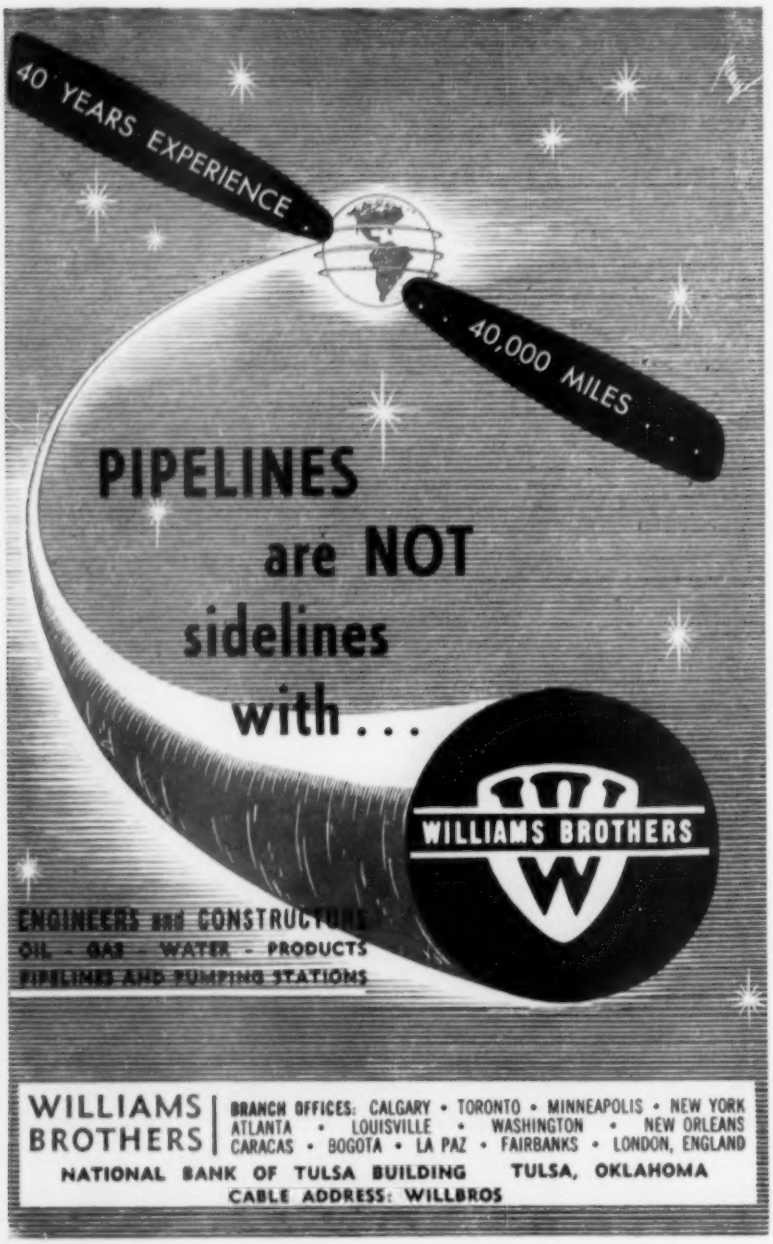
• **North Canadian Oils, Ltd.**—Company will lay 316 miles of 10-in. line from Wabumun to Hinton, Alta. The gas will be sold to a pulp mill at Hinton. Mid-Western Industrial Gas, Ltd., which will supply the gas along with North Canadian, will build a line from its gas fields in the Alexander, Majeau Lake, and Westlock districts to Wabumun.

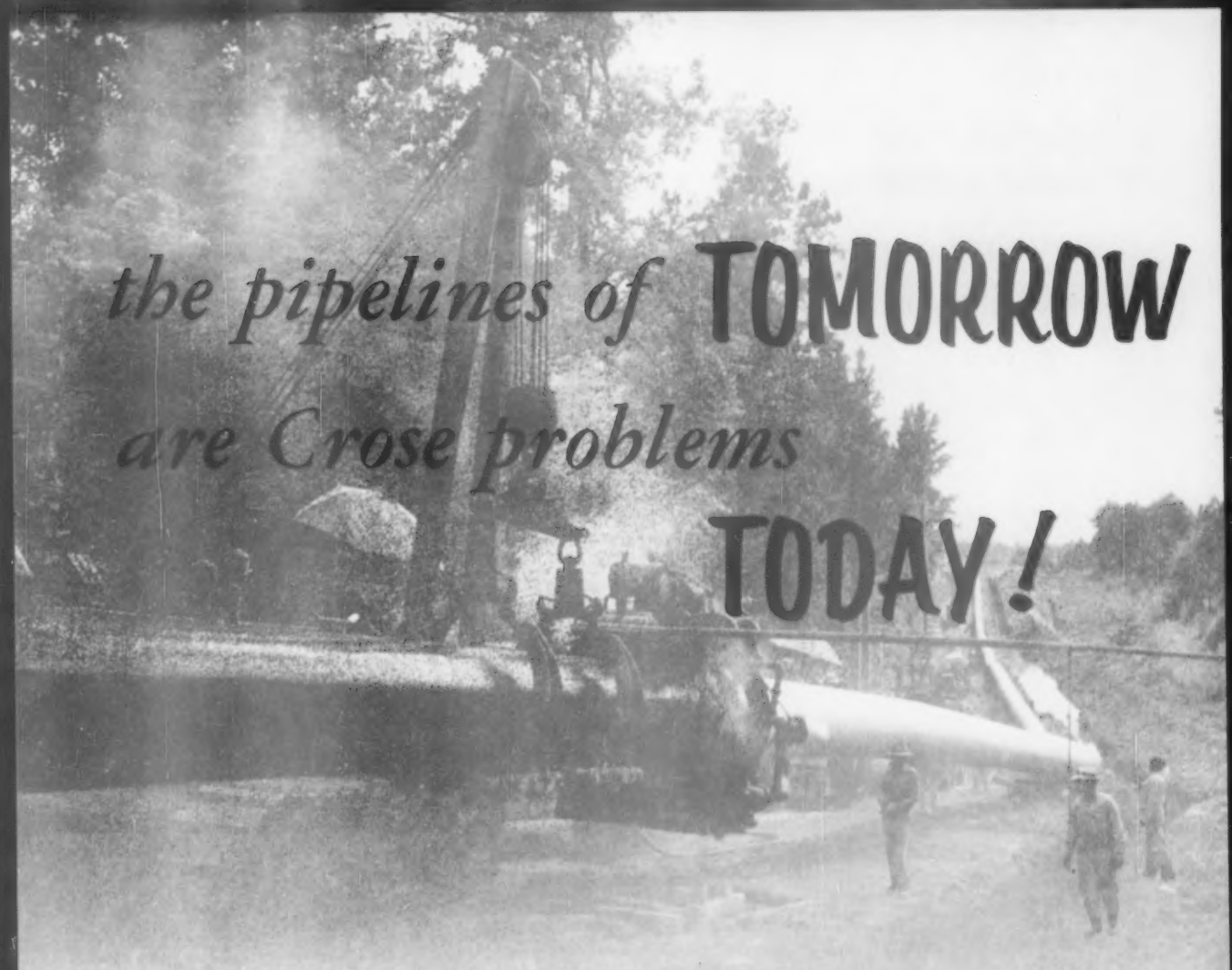
South Alberta Pipe Line, Ltd.—Company has filed permit to construct a 150-mile, 8-in. natural-gas line from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta. The line will cost about $1,000,000.

Saskatchewan Power Corp.—Company has let contract to Majestic Contractors, Ltd., Edmonton, for a 226-mile natural-gas pipeline from Coleville to Prince Albert. The line from Coleville to Saskatoon will be 116 miles of 14-in. From Saskatoon to Prince Albert the line will include 40 miles of 12-in. and 70 miles of 10-in. Banister Construction, Ltd., has the distribution system for Prince Albert.

• **Sui Gas Transmission Co.** — Pakistan Constructors, a joint company of Morrison-Knudsen, Boise, Idaho, and William Press, Ltd., London, have contract to build a 188-mile, 16-in. line from Sui gas field to Moultan, Pakistan. Work will begin in mid-1956. The line will later be extended to Lahore, with branches at Kot Addu, Jhang, Magiana, and Montgomery.

• **Westcoast Transmission Co., Ltd.** — Company has signed agreement with Pacific Northwest Pipeline Corp. and has revived plans for its line from the Peace River area of Alberta and British Columbia to the United States border near Sumas, Wash. Plans call for work to begin sometime this year. Company has also announced plans for a second line to parallel the first and to swing east into the Okanagan Valley.


40 YEARS EXPERIENCE . . .
. . . 40,000 MILES . . .
PIPELINES
are NOT
sidelines
with . . .
WILLIAMS BROTHERS
ENGINEERS and CONSTRUCTORS
OIL - GAS - WATER - PRODUCTS
PIPELINES AND PUMPING STATIONS
WILLIAMS BROTHERS
BRANCH OFFICES: CALGARY • TORONTO • MINNEAPOLIS • NEW YORK
ATLANTA • LOUISVILLE • WASHINGTON • NEW ORLEANS
CARACAS • BOGOTA • LA PAZ • FAIRBANKS • LONDON, ENGLAND
NATIONAL BANK OF TULSA BUILDING TULSA, OKLAHOMA
CABLE ADDRESS: WILLBROS



the pipelines of TOMORROW *are Crose problems* TODAY!

Crose engineering and research is constantly working to develop new and better pipeline construction equipment. The 36″ cleaning and priming machines — coating and wrapping machines used on the Transcontinental Gas Pipeline job were the result of Crose engineering and research. The machines, largest of their kind, show the forward thinking of Crose designers. Whatever equipment tomorrow's pipelines will demand — you can bet that Crose will build it.

m.j. Crose
Manufacturing Company, Inc.

2715 DAWSON ROAD
PHONE MAdison 6-2172
TULSA, OKLAHOMA

15225 EAST COLFAX AVENUE, AURORA, COLORADO
500 FIFTH AVENUE, NEW YORK CITY
DISTRIBUTORS:
CROSE-CURRAN LTD., EDMONTON
CROSE PIPELINE EQUIPMENT CO., INC., NEWARK, N. J.
PIPELINE SUPPLY CO., HOUSTON

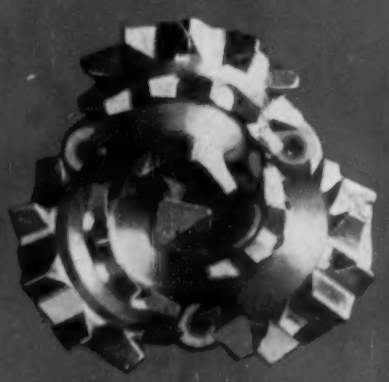
PERFORMANCE IN THE FIELD...

IS THE PERFORMANCE THAT **PAYS OFF!**

The true value of ANY drilling bit is determined *only* by performance in actual drilling service. That is why Globe places such great emphasis on field testing to prove the digging qualities of Globe Bits in the oil fields instead of merely estimating them in the laboratory.

Proof that Globe Performance "Pays Off" is constantly reflected by the increased use of Globe Bits throughout the world . . . 24% more Globe Bits were used in the first six months of 1955 than in the corresponding period of 1954.

GLOBE
2 and 3 Cutter Rock Bits, Regular and Jet Type Offer Operators Everywhere, a New Standard in Oil Well Drilling



Globe "S52C" Jet Rock Bit

Globe "S52C" Jet Rock Bit

GLOBE
OIL TOOLS COMPANY
GLOBE OIL TOOLS
Serving the Petroleum Industry with the Best in Drilling Equipment

LOS NIETOS, CALIFORNIA
Branches in All Principal Drilling Areas

Among the Drilling Contractors

Great Western Contracts For Five Colorado Wells

Great Western Drilling Co., Midland, Tex., has contracted with Byrd Oil Corp. and associates, of Dallas, for five more wells the latter operators have scheduled for drilling on the Florida Mesa prospect, in LaPlata County, southwestern Colorado, before January 1, 1956.

Rig already is being moved to first location, in 20-34n-9w, about 6 miles southeast of Durango. It is about 2 miles west of a wildcat test, 1-A Steve Simon, in which the above operators encountered numerous gas showings.

The Fruitland and Pictured Cliffs, and possibly the Mesa Verde, formations will be tested. The contractor has an option to drill another test to the deeper Dakota and Morrison formations. The area is northwest of the Ignacio structure.

Maxwell Herring is contractor on a 5,000-ft. wildcat test B. F. Weekley, of Fort Worth, is drilling at 1 Bridehorn & Dodson, in the M. D. McClure Survey, 5 miles north of Queen City, in Cass County, northeastern Texas.

A. W. Thompson, Inc., Houston, has taken on another deep-drilling job in Lea County, New Mexico. It is a 13,100-ft. test for Cabot Carbon and others at 1 Howard Fleet et al. in the undesignated new area southwest of King field, 7 miles south of Gladiola. Spot location is in 35-13-37.

Basco Drilling Co., Bakersfield, Calif., is drilling for Ajax Oil & Development Co. at a wildcat location in the Acolita area, in Imperial County, southern California. Location is at 1 USL-Phyllis, in 2-13s-17e. Varnon Shadrick is pushing tools for Basco.

Coon Drilling Co. has a rig working on a 9,000-ft. contract job on the southwest flank of Thompsons field, in Fort Bend County, Texas Gulf Coast. The test is for So Relle & So Relle, of Houston, at 1 King, in the Robert Peebles Survey. Location is 5 miles south of Thompsons townsite.

T. G. & M. Drilling Co., Wichita Falls, Tex., is keeping a rig running in the West Saratoga area, Hardin County, Texas Gulf Coast. It is drilling for Michel T. Halbouty. Current operation is at 1 Bullock estate, in the T. C. Gaines Survey. It is a 7,500-ft. Yegua test, 2 miles south of Saratoga townsite.

Pike Buys Equipment Firms

The Thomas P. Pike Drilling Co., of Los Angeles, has acquired the physical assets of the World Supply Co. and Drilling Equipment & Rental Co., both of Long Beach. The acquired equipment will be used in the operation of the firm's 18 rigs, Stanwood I. Williams, president of Pike, said.

Henderson Drilling Co., Houston, is getting started on a new deep wildcat test for Ada Oil Co., of Houston, in the Wilson Creek area, 3 miles southwest of Buckeye, in Matagorda County, Texas Gulf Coast. The test is carried as 1-B J. C. Lewis, in the GBM Cotton Survey.

Appling Drilling Co., El Campo, Tex., has a new wildcat operation under way 12 miles southwest of El Campo, in southwestern Wharton County, South Texas. It is a contract job for Sam G. Harrison, Jr., at 1 Hillyer, in the M & C Survey 13. Contract calls for a 7,500-ft. test.

Otis W. Dyer, Jr., Houston, has a new wildcat operation under contract. It will be a 10,450-ft. test in the Melville area, of St. Landry Parish, southern Louisiana. Kendall Shaw, of New Orleans, is the operator. The test is at 1 Artall, in 2-5s-7e.

Deckard Drilling Co., Shreveport, is drilling for Robert Womack and Tip Ray at a wildcat location 4 miles south of Camden, in Madison County, Central Mississippi. Contract is for a 5,600-ft. Tuscaloosa test. Location, at 1 Austin, in 12-10n-4e, is about 4½ miles east of Carter Oil Co.'s Loring field, productive from Smackover lime below 12,200 ft. with two wells completed.

A & B Well Service Co., Bossier City, La., will drill a 4,800-ft. Lower Cretaceous test in southeastern Richland Parish, northeastern Louisiana. It is a contract job for A. W. Phillips and Texas Oil Producing Co., Inc. Location is for 1 Hardy. It is in 6-14n-7e.

PROTECT NEW JOINTS

Trying to break out galled and seized new tool joints often results in bent drill pipe. You can prevent this by making up new joints with 'Bestolife Lead Seal. 'Bestolife provides the necessary film strength and metal cushioning to prevent galling and seizing during the critical break-in period—and permits easy break out. This means long, economical life for tool joints. 'Bestolife is stocked by leading supply houses the world over. In 1¼, 5, 20 and 50 lb. cans. Unconditionally guaranteed.

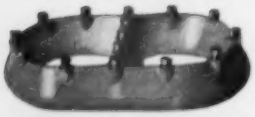
MUDWONDER®

SEALS DROP TIGHT

NEW Rockwell-Built MUD VALVE

Edward Valves, Inc.
Subsidiary of ROCKWELL MFG. CO.
1212 W. 145th STREET
EAST CHICAGO, INDIANA

Streamlined



INFERNO
Stack Blowers

INFERNO Steam Stack Blowers are streamlined to secure the least resistance to flue gases and occupy a minimum of space. Stainless steel nozzle jets. Malleable iron bodies. Up to 425% boiler capacity may be obtained by using only 10% of the steam generated. Write today for copy of Bulletin 22-A.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

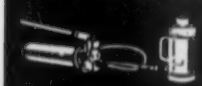
PUT OIL TO WORK
with SIMPLEX
HYDRAULIC JACKS
and PULLERS

- Pull Bits, Casings, Valve Seats, Bushings, Wheels
- Lift and Skid Rigs, Machinery
- Bend or Straighten Pipe

SIMPLEX Hydraulic Jacks
Single and double pump models from 3 to 100 tons capacity.

SIMPLEX - Jenny Hydraulic Pullers
"Center-Hole". Pulls or pushes. Models 30 — 100 tons capacity.

Re-Mo-Trol Remote Control Puller



Safer to use, operates in tight spots. For pushing or pulling "Center-Hole" on rams over 30 tons 10-100 tons capacities.

WRITE FOR COMPLETE INFORMATION

Simplex Jacks

TEMPLETON, KENLY & CO.
2539 GARDNER ROAD, BROADVIEW, ILLINOIS
A. C. Templeton, 5627 Del Roy Drive, Dallas, Tex.

6 miles northwest of Winnsboro, and 6½ miles southeast of the old Richland gas area.

Justiss-Mears Drilling Co., Jena, La., is on a wildcat location a mile northwest of Holly Ridge field, In Tensas Parish, eastern Louisiana, for a 5,700-ft. Wilcox test it has contracted to put down for Union Producing Co. Union lists the test as 22 Penrod-Jurden with spot location in 8-11n-10e.

Natchez Drilling Co., Natchez Miss., is under contract for four more wells E. C. Wentworth has projected for Ross Bayou field, in Catahoula Parish, eastern Louisiana. All (1-B, 2-B, 3-B, and 4-B Rhone) are on the north side of the field in 37-6n-7e. They will be drilled to 5,950 ft. in the Wilcox. In the same field, **Woolf & Magee,** Tyler, Tex., has a new contract operation under way for Serio-Punches Oil Co., of Natchez. It is projected to the Wilcox about 5,700 ft. Location is at 1 Farrar Unit, in 4-6n-7e.

Drilling & Exploration, Inc., Houston, has contracted for another Smackover well Stanolind Oil & Gas Co. is starting in the new Mount Sini field, in Claiborne Parish, North Central Louisiana. It will be Stanolind's third deep well for the field. Location is for 1 Gray Unit, in 5-22n-5w, 2,600 ft. west of the discovery well, 1 Bell Unit, completed last June with oil production from two zones, one perforated at 10,220-386 ft., and the other at 10,-506-49 ft. Stanolind has another test drilling about 2,450 ft. east of the discovery well.

Brewster-Bartle Drilling Co., Houston, has a new deep operation scheduled for the Anse La Butte area, in St. Martin Parish, South Louisiana. It will be drilled for Skelly Oil Co. on the southeast flank of the dome with location at 1 Castillo, in 46-9s-5e.

Vasser & Brown, Inc., Natchez, Miss., has a rig working for S. C. Callon, G. W. Gulmon, and Peabody Oil Co., joint operators, on a 7,00-ft. Wilcox test in southeastern Adams County, Mississippi. Location is about 20 miles southeast of Natchez at 1 Drane, in 57-5n-1w.

Delta Gulf Drilling Co., Tyler, Tex., is a joint operator with Buffalo Oil Corp. on a 4,500-ft. Delaware-sand test it is drilling in northern Reeves County, West Texas. Location, in Section 3, Block 3, H&GN RR Co. Survey, is about 4 miles southwest of Wheat field, in southern Loving County. The well is 1 Sievers.

Solve High Temperature Thread Problems with C-5
Make your own ON-THE-JOB TESTS
FREE SAMPLE

No More SEIZING or GALLING of STUDS, Even at 1800° F!
- Prevents Stud Breakage
- Eliminates Pitting of Stainless Steel
- Reduces Torque
- Speeds up Disassembly

Used by leading petroleum processors for flange bolts, studs and all other threaded surfaces on reactors, cat crackers, heat exchangers, pumps and valves, etc.

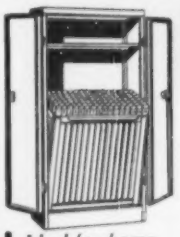
C-5 FEL-PRO "HI-TEMP" ANTI-SEIZE THREAD COMPOUND

Fel-Pro's exclusive C-5 colloidal-copper formula "copper-plates" metal, protects to 1800°F without breakdown. Reduces torque. Prevents galvanic pitting even where dissimilar metals are joined.

SEND FOR FREE SAMPLE TODAY on your company letterhead!

FELT PRODUCTS MFG. CO.
1561 Carroll Ave., Chicago 7, Ill.

CONFIDENTIAL



Ideal for home and field offices.

MAP FILE
MT4
Metal cabinet map file with locking doors. 112 tilting tubes. Easy to file and find maps, tracings to 60".

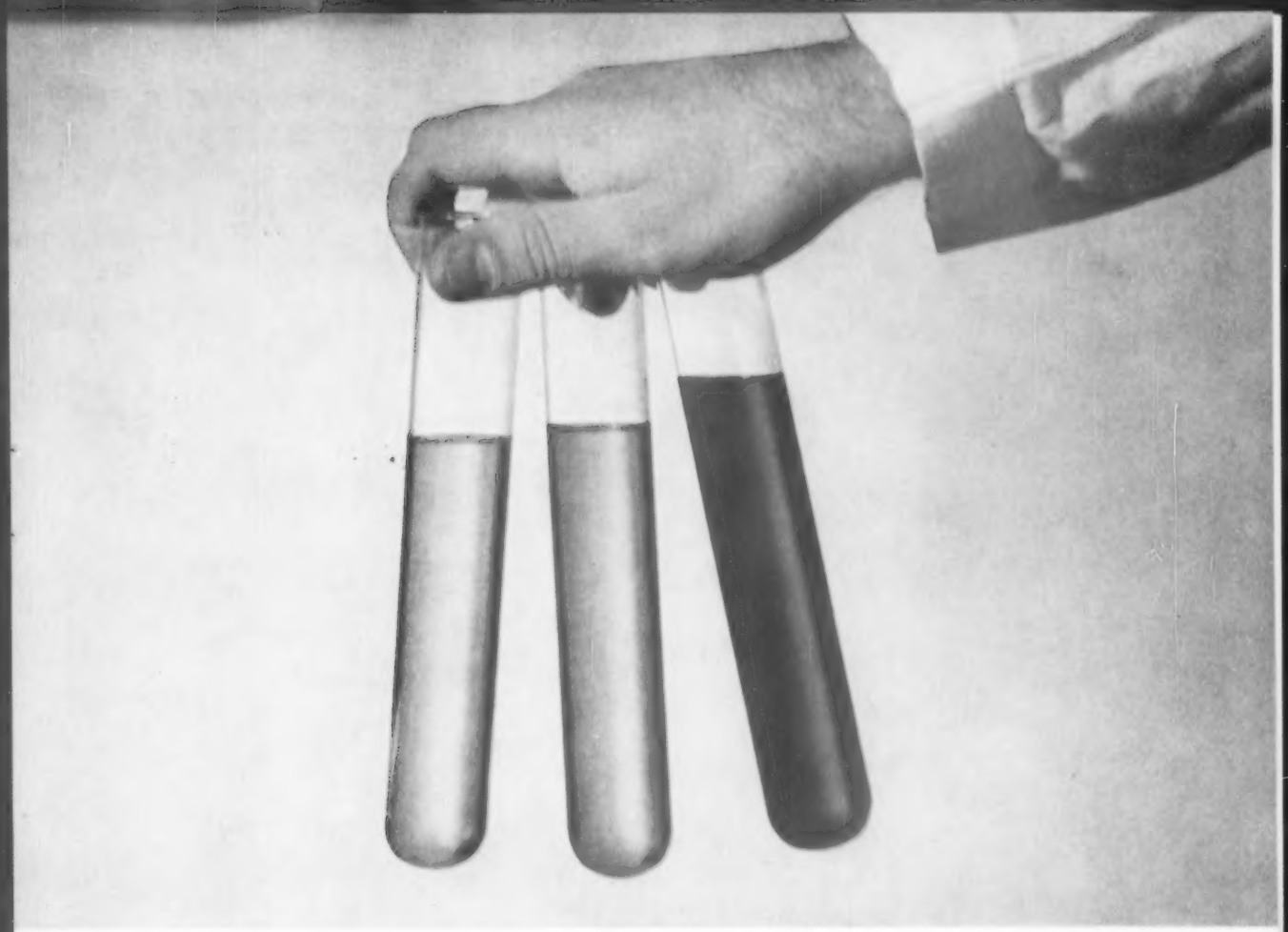
PATENT NO. 1610368 Other Patents Pending

SCOTT-RICE COMPANY
610 S. Main Tulsa 3, Okla.

Write or Wire
for Monthly Stock Lists

- VALVES
- PRESSURE TUBING
- STEEL

Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36 A
Shreveport, La.



Shipped 2,000 miles and Stored 4 months...

NALCO-STABILIZED FUEL OIL STAYS CLEAR

This blended straight-run and cat-cracked fuel oil was refined in Texas. Unstabilized, it degraded to N.P.A. Color 4.0 after tanker shipment to New York and subsequent 4 months storage. How the same oil, Nalco stabilized, withstood the trip and storage is dramatically shown in the unretouched color photo, above.

At left, a refinery fresh sample has N.P.A. Color 1.5. Center, Nalco-stabilized sample has N.P.A. Color 2.0 after 4 months. Right, untreated sample has N.P.A. Color 4.0 after 4 months.

Here is real Nalco protection against color degradation . . . protection that has the bonus value of effective sludge prevention. Nalco Fuel Oil Treatment adds up to *better fuel oil salability*, regardless of fuel types, storage or handling problems. Full data are available, now. Call or write for Technical Data Sheets on Nalco stabilizers.

NATIONAL ALUMINATE CORPORATION

6216 West 66th Place • Chicago 38, Illinois • POrtsmouth 7-7240

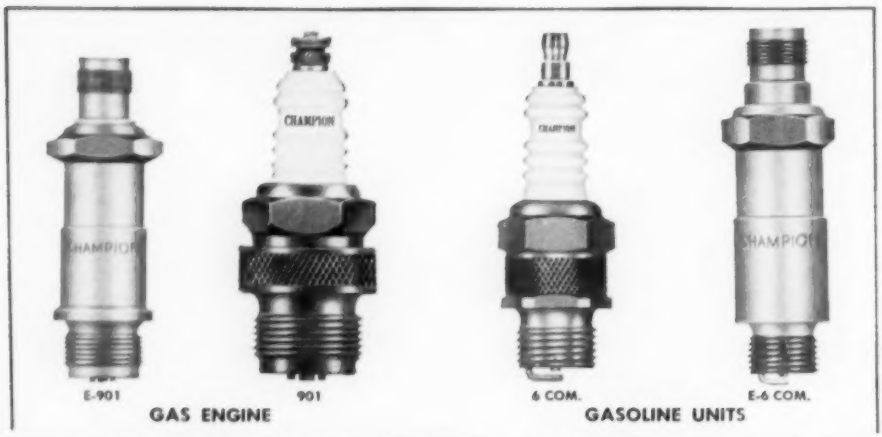
CANADA: *Alchem Limited, Burlington, Ontario*

NORTHWESTERN UNITED STATES, HAWAII AND ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota

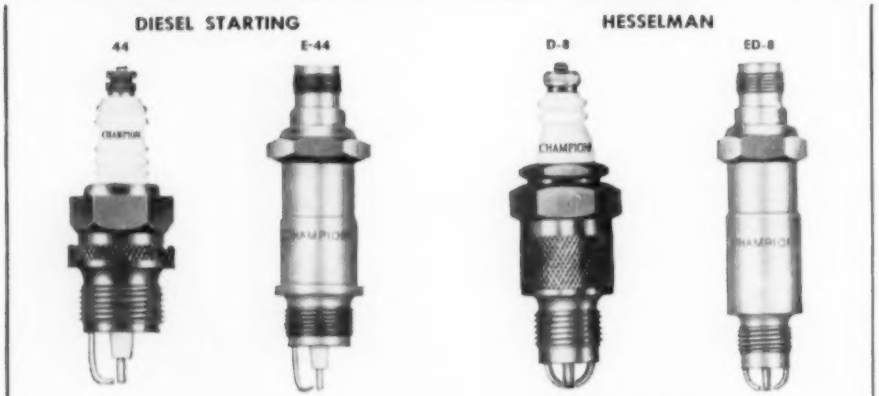
ITALY: *Nalco Italiana, S.p.A.* SPAIN: *Nalco Espanola, S.A.*
WEST GERMANY: *Deutsche Nalco-Chemie GmbH.*

nalco•

PRODUCTS...SERVING INDUSTRY THROUGH PRACTICAL APPLIED SCIENCE



For better performance in every industrial and oil field engine specify dependable CHAMPION SPARK PLUGS!



BEST FOR ANY ENGINE

CHAMPION

SPARK PLUGS

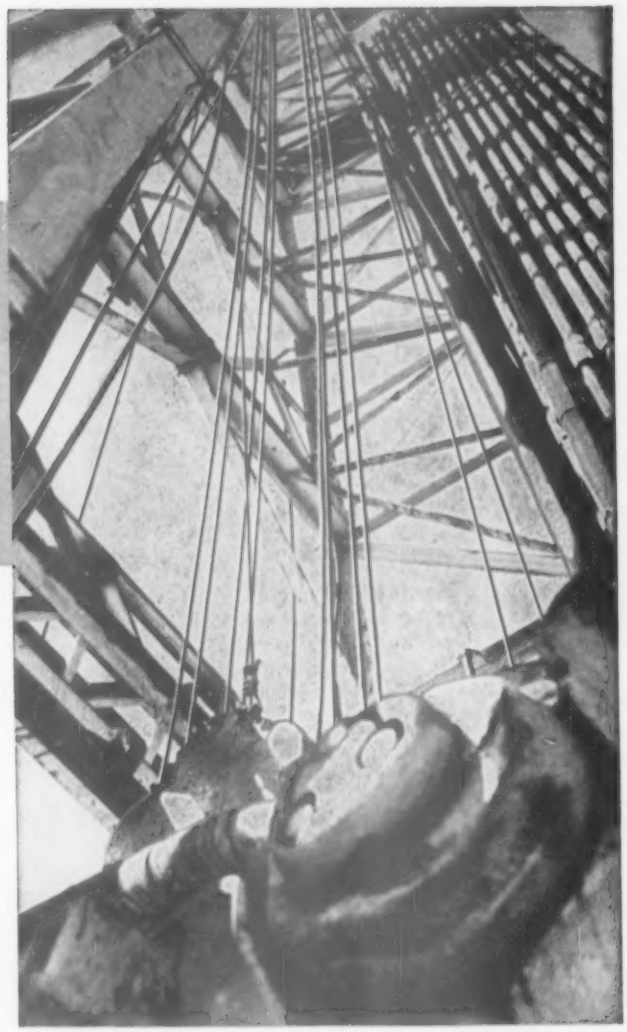
CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

an ACCO product

American Cable TRU-LAY VHS

15% Stronger

It's Tougher, too!



FOR ROTARY DRILLING LINES

TRU-LAY VHS is the new wire rope everyone is talking about. It's working on many rigs and it's making new friends every day.

Like all TRU-LAY ropes it's preformed. But it is 15% stronger than rope made of Improved Plow Steel which was the strongest available up to now. It is also tougher.

The name VHS means Very High Strength. It is so good the mill has a hard time keeping up with demand. It offers these important advantages:—

Higher Factor of Safety

Careful calculations show that the factor of safety for 10 lines of TRU-LAY VHS rope is 14.9% or 15% higher than for 10 lines of IPS rope. It is also noted that the factor of safety for 12 lines IPS is almost identical to 10 lines of VHS rope.

Faster Drilling Possible

With stronger VHS you can make round trips faster and drill to greater depth before increasing the number of parts of line.

Tougher, Too

New VHS is not only stronger—it's tougher. Stands up better under the rough abuse that drilling lines naturally get.

You can save considerable money by using TRU-LAY VHS according to our recommended practices. They will increase the service life of the rope and reduce "down time" for drilling line replacement.

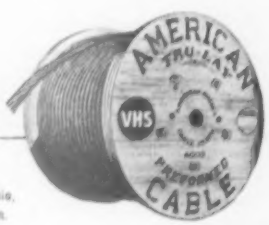
Simple Ordering Procedure

You don't need a lot of complicated specifications about constructions, etc., to be sure you are getting the best drilling line possible. Just ask your nearest Mid-Continent Supply store for a new TRU-LAY VHS drilling line in the size you need.

ASK FOR TRU-LAY VHS at your nearby Mid-Continent Supply store. For further information write to nearest American Chain & Cable Company office listed at right for **Brochure DH-489.**

ACCO American Cable Division
AMERICAN CHAIN & CABLE

Plants: Houston, Tex., Wilkes-Barre, Pa.
Offices and warehouses:
Odessa, Tex., San Francisco, Portland, Ore., Pittsburgh, Philadelphia, New York, Los Angeles, Denver, Chicago, Atlanta · Bridgeport, Conn.



This C-51 deseaming blowpipe opens transverse plate welds in steel barge bottoms 7 times faster than the previously used process.

Barges get new lease on life...

FOR 70% LESS COST

Deseaming blowpipes have cut the time required to remove these steel barge bottoms from 4 days per barge, to only 1½—and cut costs $500 per barge....

In this operation, the barges were rolled over in the water. Bottom plates were deseamed and removed, and then new plates UNIONMELT welded in position. Before removing the old plates, it was necessary to "open" seam welds, plug welds, and rivets. The deseaming blowpipes did this work with maximum speed and economy—and with minimum nicking into the support members beneath the plates.

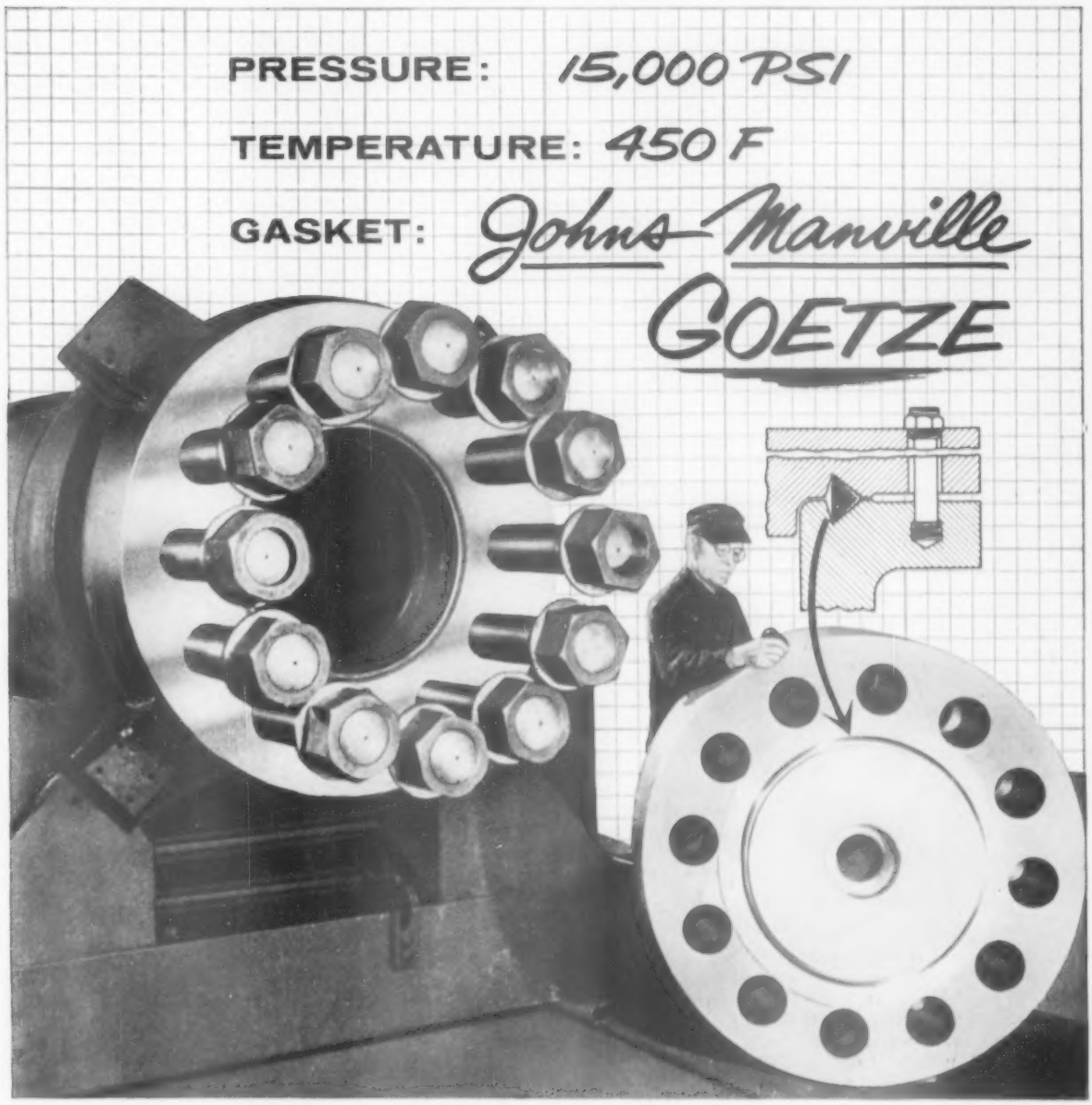
Deseaming blowpipes operate with a low-velocity oxygen stream, and make a wide pass in metal at high speeds. The depth of penetration is controlled by regulating oxygen pressure. Lightweight, easy to handle deseaming blowpipes are speeding production and repair operations throughout industry.

For more information on this or any other of LINDE's modern, money saving processes, call your local LINDE representative. Start saving now, call him today.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

Linde
Trade-Mark

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.



How A. O. Smith maintains tight seals in giant "Multi-Layer" vessels

Today's tremendous pressures and temperatures have placed special demands on manufacturers of processing equipment. A. O. Smith has answered this need with a special type of "Multi-Layer" vessel construction. And Johns-Manville in turn has provided gaskets that assure tight seals under these exacting conditions. Typical of these is the delta type gasket, illustrated above, which was designed, for this application, to withstand pressures up to 15,000 psi. and temperatures to 500 F.

The development of special gaskets to meet special purposes has been the stock in trade of Johns-Manville's Goetze division for more than sixty-five years. Expert technicians possess a knowledge of metals and other factors related to gasket design and performance that is unmatched in the field. What's more, intensive specialization and modern production tooling provide substantial cost savings on J-M gaskets.

If you need gaskets for high pressure vessels for similar applications, send us a drawing or template for quotation. If you have a sealing problem of any kind, J-M technicians will work directly with your own engineers to develop new gaskets —or adapt existing styles—to meet your specific requirements. Write for further information to Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit (Toronto), Ontario.

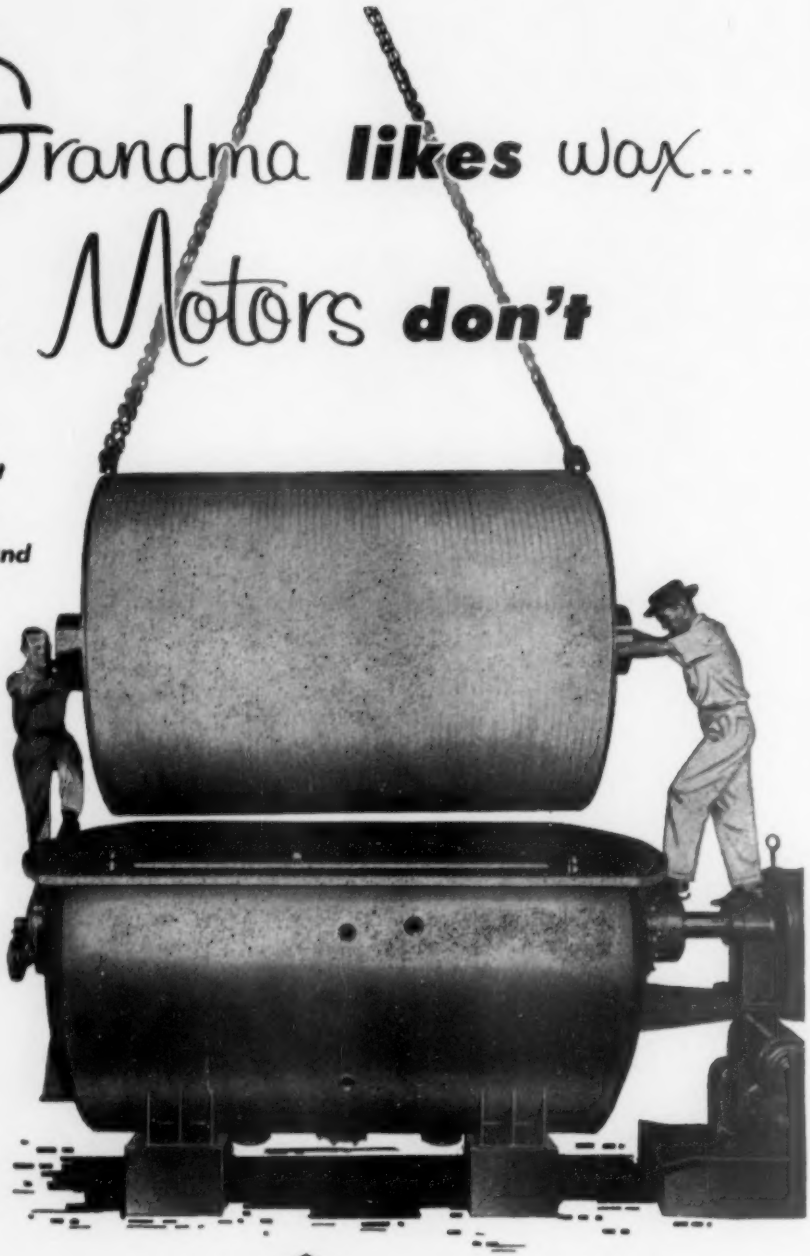
Johns-Manville PACKINGS & GASKETS

Grandma **likes** wax... Motors **don't**

GB ***builds de-waxers to fit your exact process requirements . . . tops in efficiency and long, dependable service.***

De-waxing and de-oiling rotary drum vacuum filters designed and engineered by Goslin-Birmingham have been recognized for many years as the standard for the industry. A continuous program of advancement and improvement in design, coupled with a reputation for exacting workmanship, has made G-B filters the reliable choice of leading refineries everywhere.

The newest design G-B MEK filters are 12′-0″ x 18′-8″ and provide 700 square feet of filtering area. Units are available with bearings supported on the vat, with a much stronger vat and supporting feet. Propane de-waxing filters range up to 400 square feet filtering area.



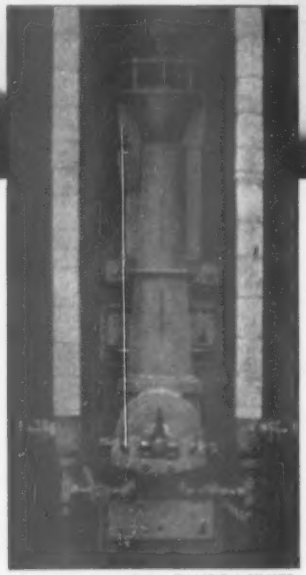
Installing the filter drum in a propane de-waxing filter. The bearings are inside the vat and involve a very unique method of holding the wear plate against the valve.

For more complete information . . . *including recent test data from many foreign refineries . . . please write our Filter Engineering Department. There is no obligation.*

GOSLIN-BIRMINGHAM MANUFACTURING CO., INC.
BIRMINGHAM • ALABAMA

FOR GASEOUS AND HEAVY RESIDUUM FUEL OIL

80 MILLION B.T.U.'s PER HOUR . . .



Showing one of the TANDEM UNITS in action . . . and photo at top right is an exterior view of the Crude Heater.

WITH NATIONAL AIROIL OIL-GAS TANDEM COMBUSTION UNITS

The unretouched photograph above shows the interior of one end of a double ended Crude Heater Furnace. Each end of this furnace is fired with eight (8) National Airoil "Airocool" Gas and Oil TANDEM COMBUSTION UNITS. Note how controlled *fuel oil* flames remain horizontal throughout the correct length of flame for maximum radiant absorption without impingement on bridge wall or roof tubes.

The TANDEM UNIT has a high turn-down ratio with a steady flame . . . maintains high flame temperature with either fuel oil or gas; can be brought quickly to full capacity with a clean fire. It is ideal for high "vis" also, fuels including asphalt bottoms.

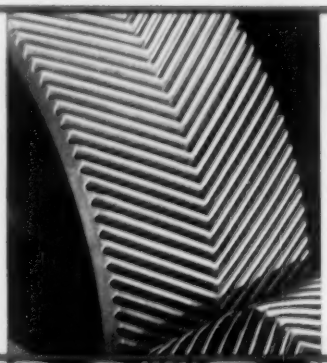
CHEMICAL-PETROLEUM DIVISION

NATIONAL AIROIL BURNER CO., INC.

Main Office & Factory: **1236 EAST SEDGLEY AVENUE, PHILADELPHIA 34, PA.**
Southwestern Division: 2512 South Boulevard, Houston 6, Texas
INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

In the market for speed increasers? then compare these Farrel® features...

1 GEAR WITH A BACKBONE

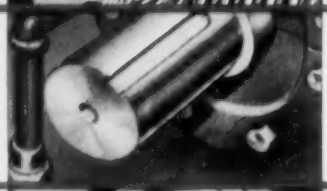


Instead of a center groove, the gears in a Farrel speed increaser have a *backbone*, formed where the helices meet. This *backbone* puts the full face width of each gear to work transmitting power. Result: Extra strength and greater load-carrying capacity in smaller space.

2 "FOUNTAIN OF YOUTH"

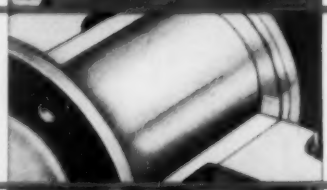
Self-contained circulating oil system puts power on "velvet" by providing a protective spray of oil at the mesh line of the gears and pressure-lubricating the bearings.

3 PRECISION-GROUND SHAFTS



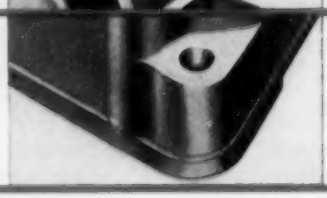
Extra large for the power to be transmitted. Give added stiffness against bending and torsional deflections under peak load conditions.

4 OVERSIZE SLEEVE BEARINGS

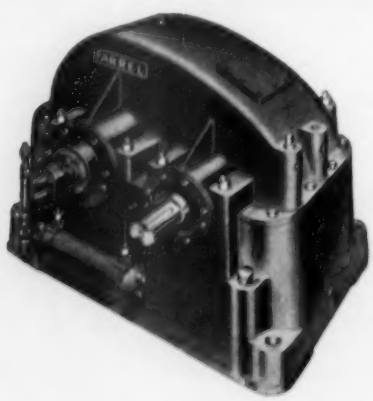


With consequent low unit pressures. Precision-finished to extremely close tolerances.

5 VERY RIGID HOUSING



Holds rotating elements in original alignment, insuring continuous operating smoothness of the gears.



These are the features which account for the amazing record of Farrel speed increasers. Since 1932, when the first of these units was put into service, not a single one has ever been replaced. Send for Bulletin 448-A.

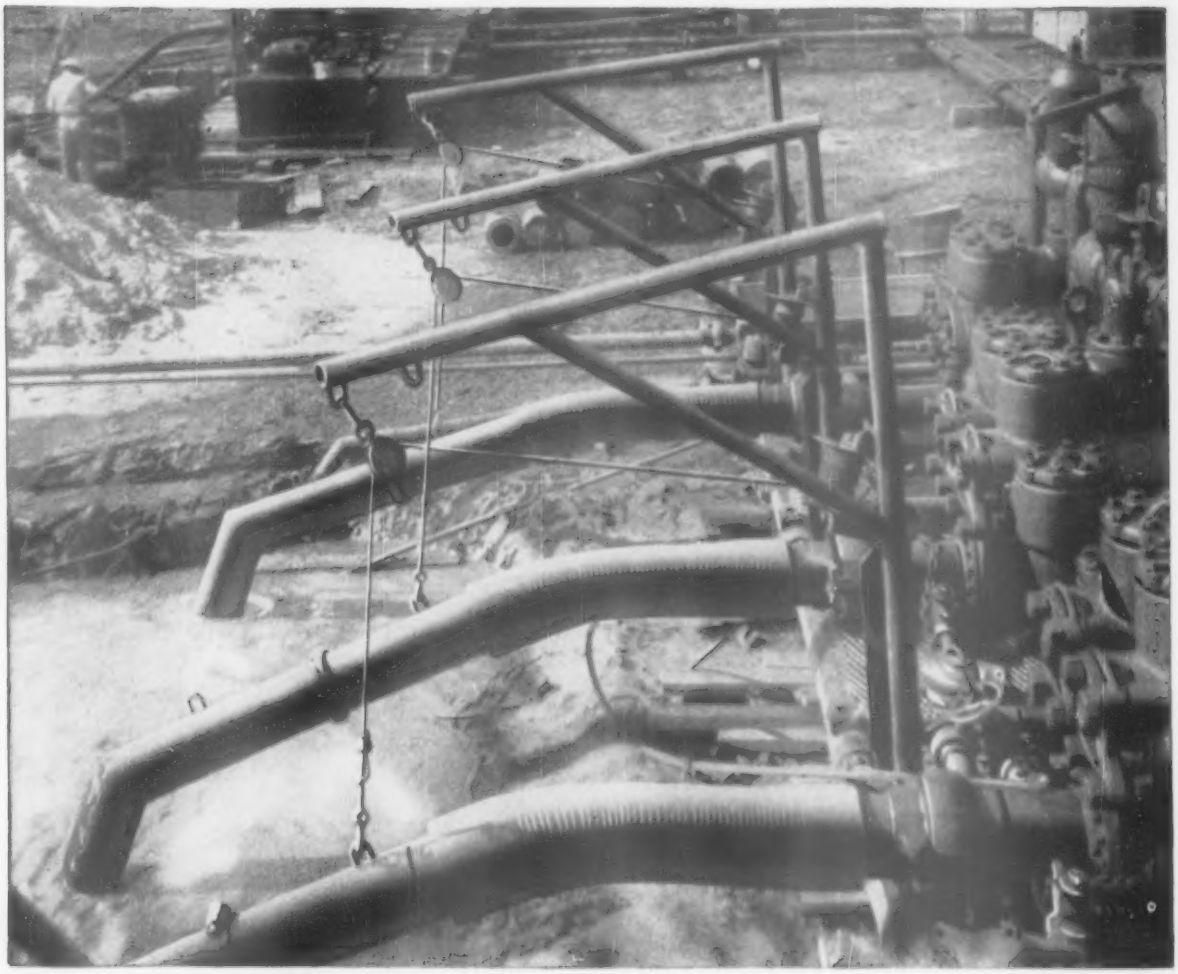
FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Pittsburgh, Detroit, Chicago, Memphis, Minneapolis, Fayetteville (N.C.), Los Angeles, Salt Lake City, New Orleans

OIL FIELD REPRESENTATIVES:
Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla.
V. W. Osborne, 860A M & M Building, Houston 2, Texas

Farrel-Birmingham®

FB 1045



here's photographic proof . . . you get better service with REPUBLIC MUD PUMP HOSE!

● A close look at this photograph reveals these facts:

(1) All equipment is *dry*, although no cumbersome clamps hold the hose in position. There are no leaks; no lost pumping pressure.

(2) Hose covers are not puckered at the bottom nor stretched at the top of the hose bends. The hose curves smoothly without stress or strain.

(3) No cuts or worn spots are evident, yet this Republic Hose has seen long service on this and other jobs.

Other features, not visible here, include special smooth bore, abrasion-resisting tubes and strong, flexible round-wire helix reinforcements that prevent collapse from suction.

Add up the facts and we think you too will want Republic Mud Pump Hose working for you —*AND SOON!!!* 6, 8, 10 and 12-inch sizes are available through your local Republic Distributor.

Stocked in the Mid-Continent Area by JONES & LAUGHLIN STEEL CORPORATION, Supply Division P.O. Drawer 2481, Tulsa 2, Okla. and the J & L Store in YOUR field.

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

INDUSTRIAL RUBBER PRODUCTS

Stocked on the West Coast by HENDRIE BELTING & RUBBER CO. 405 Towne Ave., Los Angeles, Calif. PACIFIC COAST RUBBER COMPANY 51 Main St., San Francisco, Calif.

Test proves you can save 83% with aluminum supply lines!

A RECENT TEST conducted by Kaiser Aluminum in Texas showed that the installation of an all-steel drill rig supply line costs $264 per mile! An aluminum pipe and coupler system of the same diameter costs only $44 per mile—or an 83% reduction! Here's why:

The 30-foot lengths of 4-inch Kaiser Aluminum pipe, used in the Texas test, weigh 31 pounds—compared to a back breaking 323 pounds for equivalent steel pipe in common use. This big difference in weight reduced handling time from 52 hours to 12½ hours—a saving of 39½ man hours!

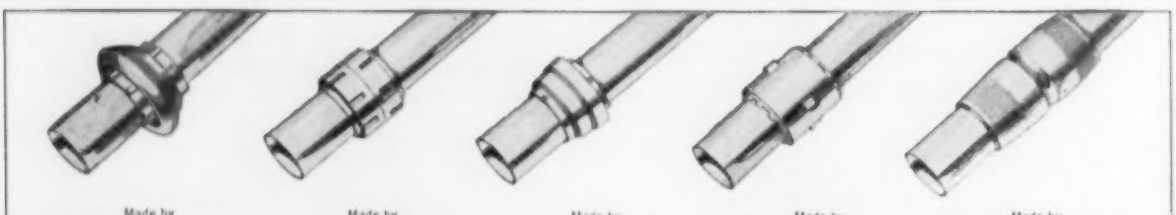
The biggest saving resulted from new quick-connecting couplers that require no welding; one man can easily join pipe sections right in the field without special equipment—in seconds. During the test, a two-man crew reduced connecting and disconnecting time from 69½ hours to 8 hours—a saving of 61½ man hours!

Available in 2, 3, and 4 inch diameters, Kaiser Aluminum petroleum pipe is rolled-formed and induction welded from high-strength aluminum alloy sheet. Design pressure is above 1500 psi, guaranteed test pressure 1000 psi, recommended operating pressure 500 psi, providing a nominal safety factor of 3 to 1. Inside surfaces are clad with high-purity aluminum to increase resistance to corrosion.

For further information, contact the Kaiser Aluminum sales office listed in your telephone directory or any of the fitting manufacturers listed below. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, Calif.

Kaiser Aluminum

setting the pace—in growth, quality and service



Made by
Food Machinery & Chemical Corp.
John Bean Division
San Jose, California

Made by
Gateway Engineering Co.
3233 W. Grand Avenue
Chicago 51, Ill.

Made by
Industrial Coupler Co.
P.O. Box 1751, 4218 Boone Ave.
Spokane, Wash.

Made by
Warren Manufacturing Co.
11 Hamburg Turnpike
Riverdale, N. J.

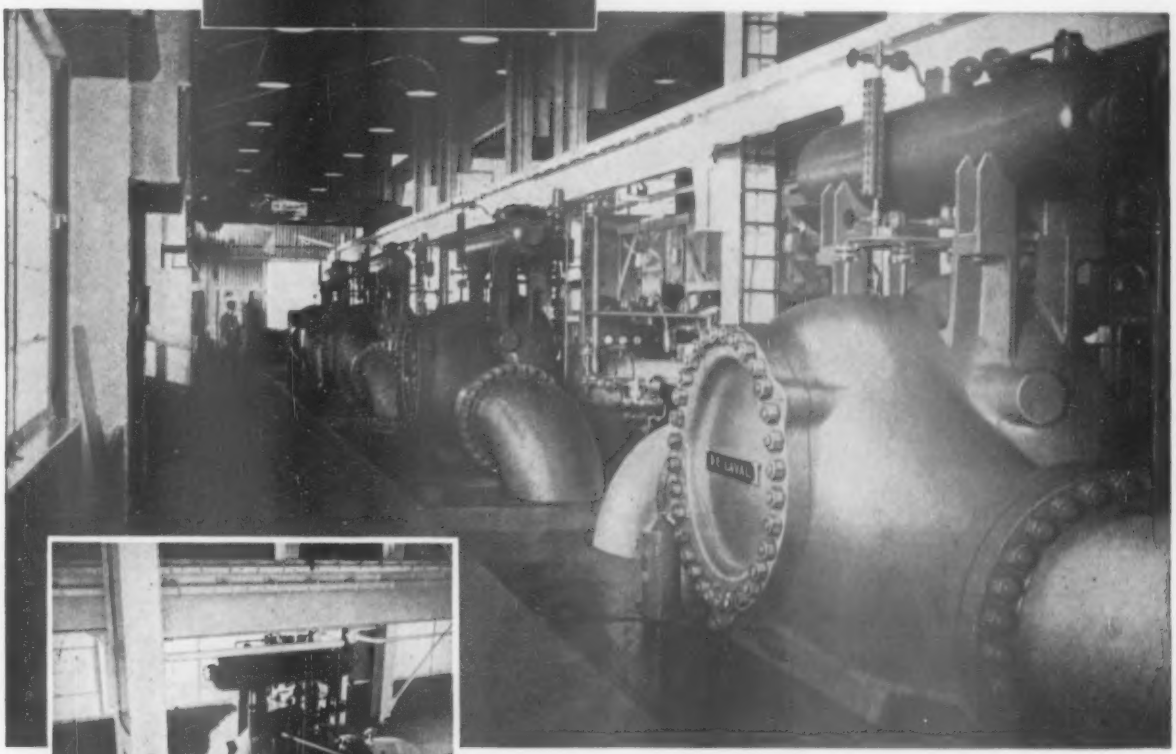
Made by
Wright Engineering & Supply Co.
1300 S. Bannock St.
Denver 23, Colo.

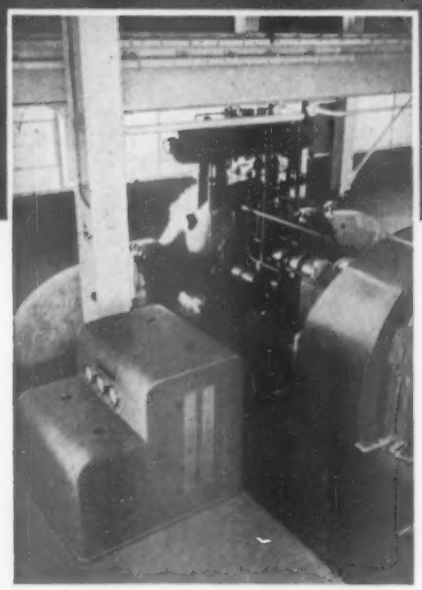
THESE FIVE tested and approved fittings require no welding: manifolding may be accomplished in the field quickly and easily. Couplers form guaranteed leakproof connections at liquid and gas pressures of 0 to 1000 psi.

FOUR

DE LAVAL CENTRIFUGAL COMPRESSORS

in Tescott, Kansas station of Northern Natural Gas





For easy installation, De Laval pipeline compressors are designed in two packages: (1) The machine plus the emergency seal tank, (2) The auxiliary console which contains the filters, pumps, coolers and other accessories.

Here's more proof of the efficiency and dependability of De Laval centrifugal compressors for high pressure gas transmission. This Tescott, Kansas station of the Northern Natural Gas Co. has four De Laval centrifugal compressors in series.

The station flow is 930 M^2SCFD, station inlet pressure 477 psig and discharge pressure 745 psig. *By changing the impeller and a few minor parts, these units can handle 1,100 to 1,200 M^2SCFD.* Three identical De Laval compressors are on the job in the Macksville, Kansas station of Northern Natural.

De Laval centrifugal compressors offer important engineering features. • Pressure contact shaft seal eliminates gas leakage. • Construction is heavy and rigid throughout. • Units have high load carrying capacity. De Laval units, totaling more than 200,000 hp, are now in operation on major pipelines.

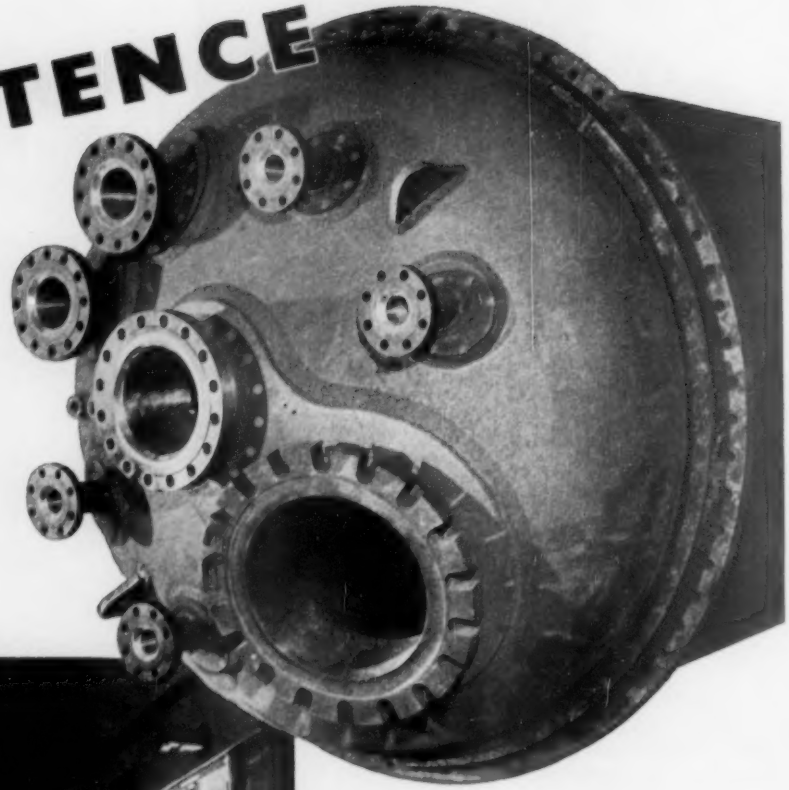
DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY

810 Nottingham Way, Trenton 2, New Jersey

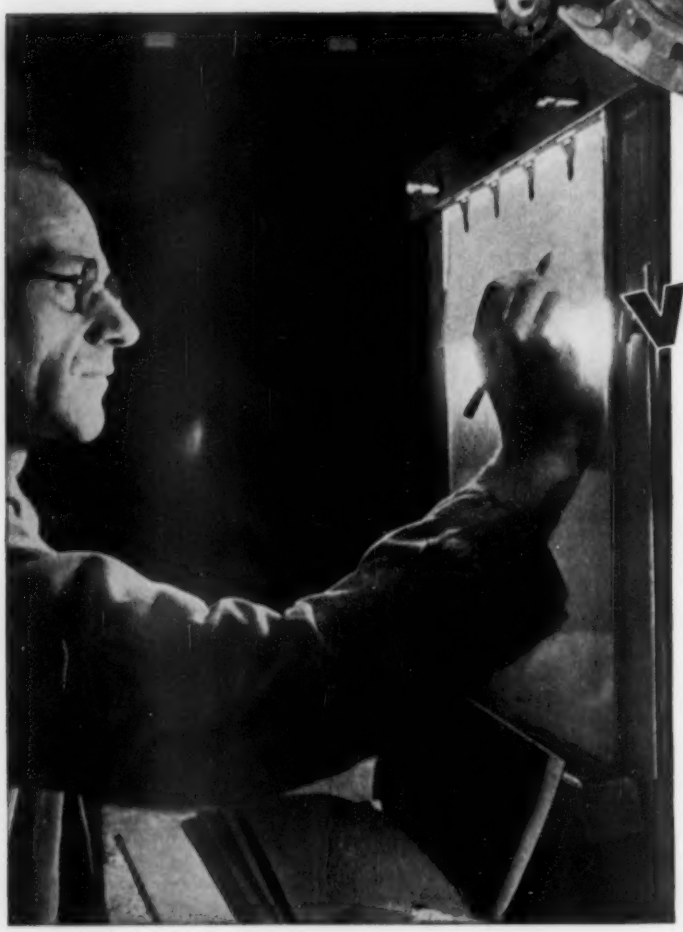
DL-909

COMPETENCE



Head of a 6 ft. dia. Autoclave, spun on the Harvey "Rotarpress" from a stainless steel disc 1⅝ in. thick.

Designed for a working pressure of 500 lbs./sq. in.



VIGILANCE

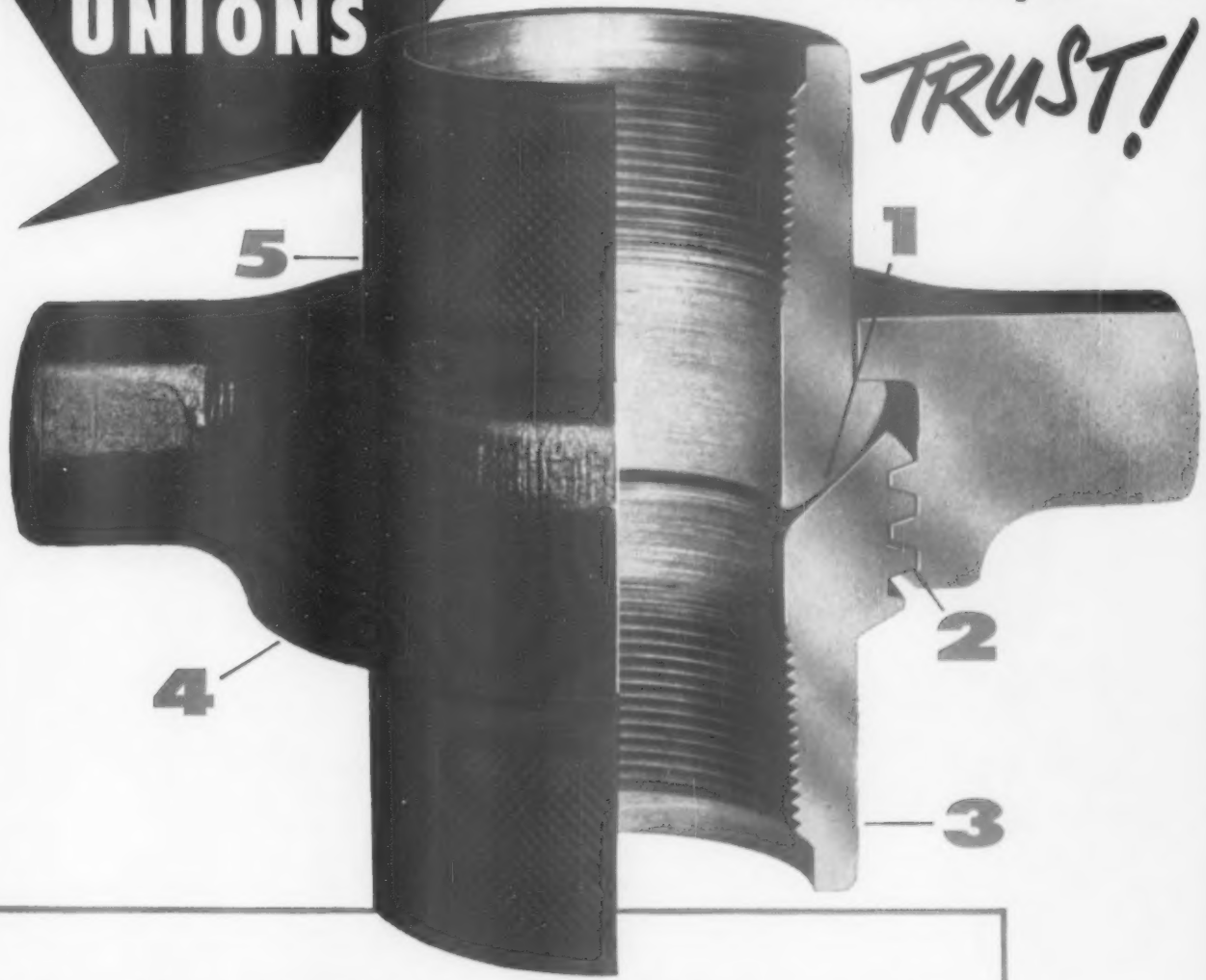
KEYNOTES OF

Harvey

FABRICATION

G. A. HARVEY & CO. (LONDON) LTD., Woolwich Road, London, S.E.7. Cables: 'Cheaper, London'

WECO UNIONS ... famous for service you can TRUST!



1. **PRECISION-MACHINED BALL AND CONE SEAT** produces a metal-to-metal seal that holds like a vise against high pressures, shock, surge and vibration.
2. **RUGGED ACME THREADS** on female sub and wing nut make-up and break-out fast — time and time again — without damage or distortion.
3. **HEAVIER WALL SECTIONS** give WECO Unions extra strength, extra ruggedness against distortion, vibration and shock pressures.
4. **STRONGER WING NUT** takes the roughest punishment workmen can dish out — and ask for more — month after month.
5. **SUB ENDS** are machine finished and knurled to assure uniform thickness of wall sections — permit faster, easier wrenching.

WECO®

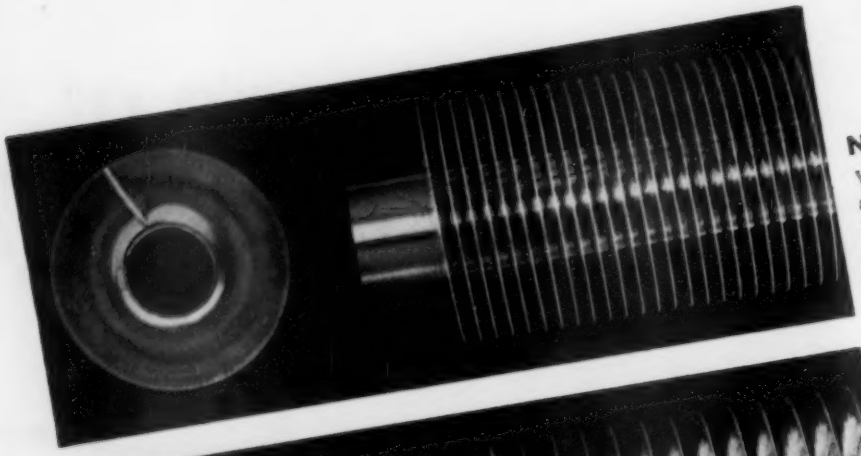
WELL EQUIPMENT MFG. CORP.

HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

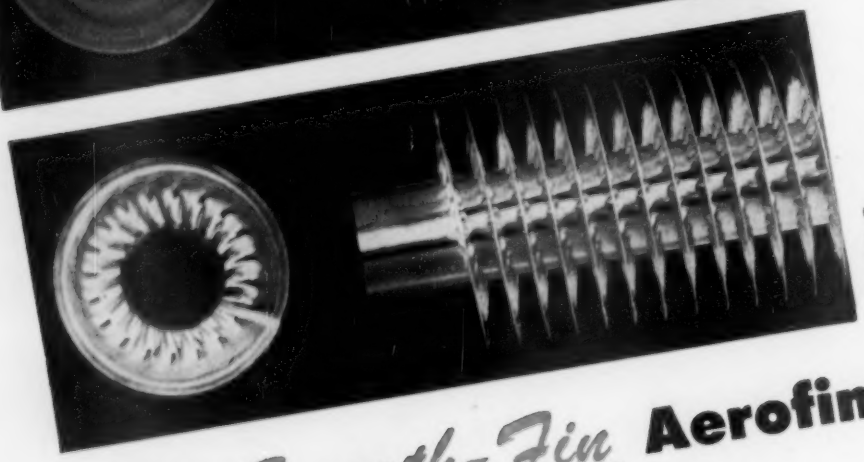
PESA

fmc



New Smooth Fins

Wide base provides ample contact surface. Smooth fins can be closely spaced without increasing resistance.



Old Type Fins

Crimped to provide necessary contact surface, widely spaced to reduce air friction.

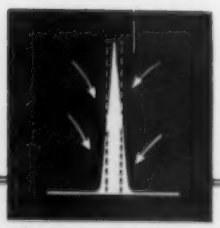
NEW *Smooth-Fin* Aerofin Coils

for Greater Capacity— Lower Resistance

Aerofin extended-surface heating and cooling coils now offer you an even greater area of effective surface — even greater capacity — per square foot of face area. Airway resistance is lowered; higher air velocities can be used. The result is extremely high heating or cooling capacity in a given space.

Compact, sturdy, standardized encased units arranged for simple, quick, economical installation.

Write for Bulletin S-55



The new Aerofin smooth fins are tapered, with wide base that conducts sufficient heat between fin and tube to make the entire fin effective transfer surface.

AEROFIN CORPORATION

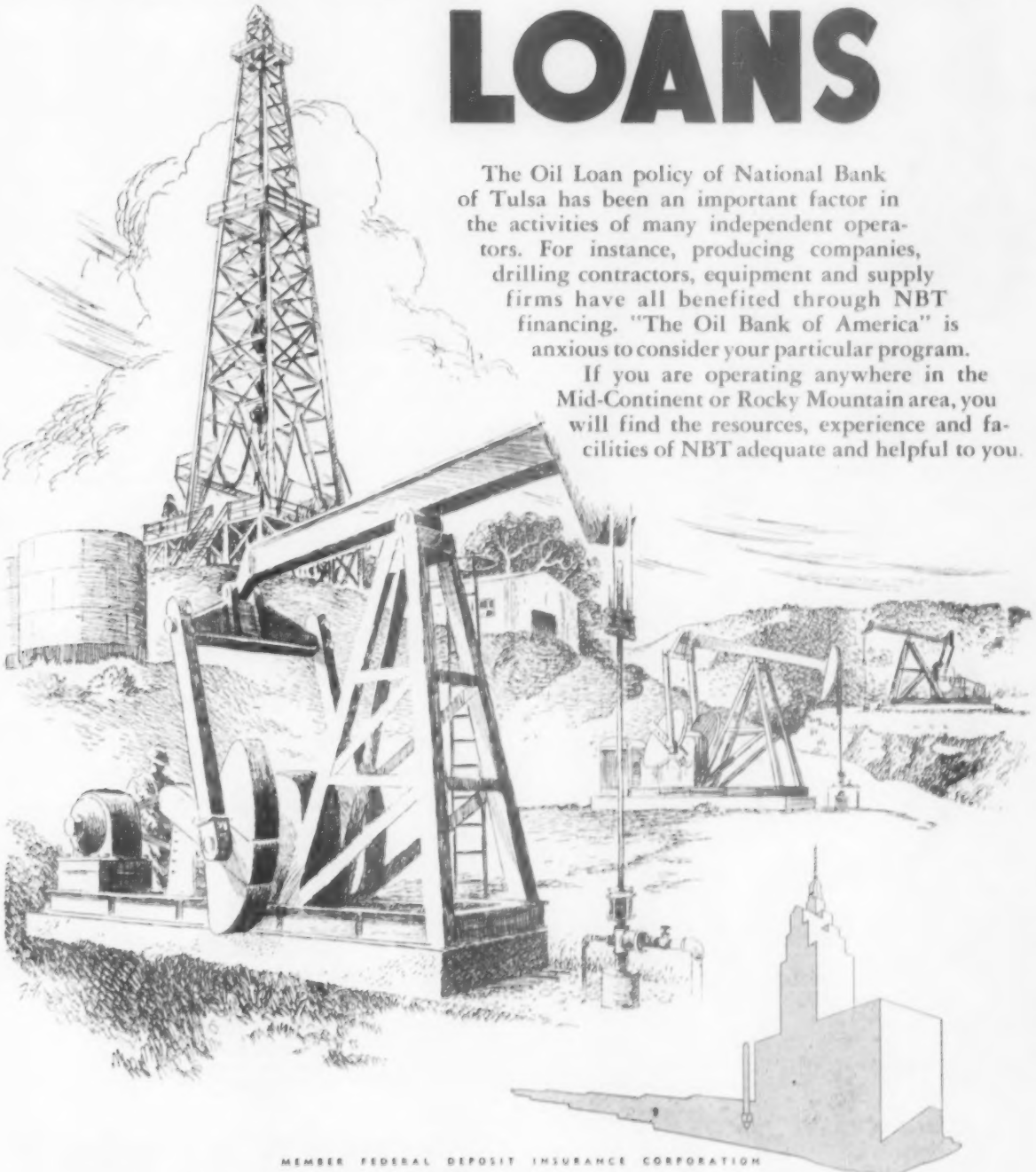
101 Greenway Ave., Syracuse 3, N. Y.

Aerofin is sold only by manufacturers of fan system apparatus. List on request

SOUND OIL PRODUCTION
LOANS

The Oil Loan policy of National Bank of Tulsa has been an important factor in the activities of many independent operators. For instance, producing companies, drilling contractors, equipment and supply firms have all benefited through NBT financing. "The Oil Bank of America" is anxious to consider your particular program.

If you are operating anywhere in the Mid-Continent or Rocky Mountain area, you will find the resources, experience and facilities of NBT adequate and helpful to you.



MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

NATIONAL BANK OF TULSA

The Oil Bank of America

OFFERING COMPLETE BANKING AND TRUST SERVICES

You bet... we always rely on United!

Down time? Not any more. We get oil field supplies from United Supply. We take their reliable, fast service for granted now. Yep, they carry nationally known products and always have them on hand. You can sure rely on United Supply.

YOU CAN RELY ON UNITED SUPPLY
UNITED SUPPLY
COURTESY • SERVICE • DEPENDABILITY

UNITED SUPPLY

AND *Manufacturing* COMPANY

TULSA, OKLAHOMA

Stores in:
KANSAS, OKLAHOMA, TEXAS, LOUISIANA, AND NEW MEXICO

EQUIPMENT MEN . . . in the News

Brewster Celebrates 45th Birthday

Glenn Peel, president of Jet Drilling Co., Denver, talks over his purchase of the Brewster N-95 with Dave Bovaird, Bovaird Supply Co., who sold Jet Drilling the rig displayed at the 45th birthday of Brewster Co.

More than 1,000 of the oil industry's top hands took turns at operating a deep drilling Brewster N-95 drawworks at Brewster Co.'s plant in Shreveport, October 18, to celebrate its 45th birthday as a manufacturer of drilling equipment.

Mounted on a high substructure, the new N-95 on display was purchased by Jet Drilling Co. of Denver through Bovaird Supply Co.

Brewster's craftsmanship was also graphically presented by a layout of N-12, N-95, N-55, and N-4 rigs, powered for drilling from 2,000 ft. to 4 miles deep, in various stages of completion along the production line.

Founded by the late H. C. Brewster as a small oil-field repair shop during the oil-boom days of 1910, the Brewster Co. is now one of the top manufacturers of drilling equipment in the country.

Pierson Joins Eggelhof As Vice President

T. H. Pierson has joined Eggelhof Engineers, Inc., Houston, as vice president. Pierson will head one of the process divisions and also assist in over-all management of the engineering company, which maintains seven offices in Texas, Louisiana, and Oklahoma.

Prior to joining the company, Pierson was with Corn Products Refining for 8 years. In 1954 he was promoted to technical staff assistant to the manager of Argo plant, which position he held until he joined Eggelhof.

Petro-Chem Announces New Sales Agents

The appointment of Rawson & Co. of Houston and William H. Mason Co. of Tulsa as representatives has been announced by the Petro-Chem Development Co. of New York City.

Rawson & Co. will serve all of Texas with the exception of the Panhandle area, all of Louisiana, and southern Arkansas. William H. Mason Co. will serve northern Arkansas and Kansas City, Mo.

Petro-Chem Development Co. designs and builds the Iso-Flow heater which is used in oil refinery, petrochemical, and chemical industries.

Rockwell Names Cochran To Head New Denver Branch

Rockwell Manufacturing Co.'s meter and valve division has opened a branch office at Denver and has named Orville Cochran branch manager. Cochran has been a sales engineer for Rockwell in the Rocky Mountain territory for more than 25 years. He joined the company in 1922, spending 8 years in the Kansas City district office.

New Organization Buys Research, Inc. Facility

Announcement has been made of the purchase by Ore Research & Laboratories, Inc. of the lease and laboratory equipment formerly belonging to Research, Inc. at Dallas, Tex.

Ore Research & Laboratories, Inc. is a newly formed Texas corporation, principal stockholders of which are Bert Fields, H. T. Manning, and Paul F. Osborne.

Officers are: Melvin Pollard, president; J. M. Morris, vice president; and H. T. Manning, secretary-treasurer. The new corporation, in addition to its Dallas office and laboratories, maintains an office at Denver, Colo.

Jones & Laughlin Dedicates Research Lab

Jones & Laughlin Steel Corp., dedicated this new research laboratory at Pittsburgh, Pa., on October 28. The laboratory, which cost over $1,500,000, contains the most modern equipment for handling the research problems of a steel company.

The building stands on a five-acre site, part of a 700-acre tract owned by J&L, overlooking J&L's Pittsburgh works on both banks of the Monongahela River just upstream from Pittsburgh's Golden Triangle.

The laboratory also houses the administrative activities of the research division; a 3,500-volume library; accounting and purchasing offices; and a fully equipped machine shop.

The new laboratory has a total floor area of about 40,000 sq. ft. It consists

WHAT ASBESTOS PIPE LINE FELT DO YOU NEED?

- NICOLET 15# ASBESTOS PIPE LINE FELT.
- NICOLET 15# GLASS YARN REINFORCED ASBESTOS PIPE LINE FELT.
- NICOLET 15# PERFORATED ASBESTOS PIPE LINE FELT.
- NICOLET TUFBESTOS.
- NICOLET "REFLECTO" ASBESTOS PIPE LINE FELT.

If these standard products do not meet your specifications we will be pleased to work with your engineers to help solve your problem.

The Felt With a Future

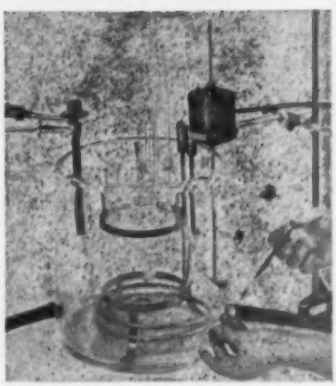
MANUFACTURED BY:
NICOLET INDUSTRIES, INC.

70 PINE STREET
NEW YORK 5, N. Y.

NEW VAPOR EQUIVALENT APPARATUS

ACCURATE, QUICK VAPOR APPARATUS OF LP RESIDUES AND OTHER LIQUID ORGANIC SAMPLES

A new instrument which measures volume of vapor produced by a unit volume of liquid. Also determines molecular weights by an adaptation of the Victor Meyer method. Vapor equivalent determinations can be made of residues from natural gas samples, or of any liquid with a vapor pressure of more than 4mm. at the temperature of the vaporization bulb. Unit is compact, mounted within a glass constant temperature bath. Unit consists of a vaporization bulb with an integral multiplying manometer and a removable sample entry system consisting of an orifice and matching pycnometer. Bath is equipped with an electric heater.



cenco

The most complete line of scientific instruments and laboratory supplies in the world

REFINERY SUPPLY COMPANY
621 EAST FOURTH STREET • TULSA 3, OKLAHOMA
2215 McKINNEY AVENUE • HOUSTON 3, TEXAS

CENTRAL SCIENTIFIC COMPANY
1700 IRVING PARK ROAD • CHICAGO 13, ILLINOIS
CHICAGO NEWARK BOSTON WASHINGTON DETROIT SAN FRANCISCO
SANTA CLARA LOS ANGELES TORONTO MONTREAL VANCOUVER OTTAWA

of a one-story office building (171 ft. by 49 ft.) and a two-story laboratory building with basement (181 ft. by 55 ft.).

Foxboro Names Tivy Chief Application Engineer

Vincent V. Tivy, formerly manager of refinery instrument sales for Foxboro Co., Foxboro, Mass., was recently appointed the firm's chief application engineer, responsible for coordinating sales engineering with product development and production-engineering activities.

Enlarged in scope, Tivy's responsibilities also involve new product development, field trials, special sales work involving analysis of automatic control problems, and the evaluation of instrumentation trends. He will also serve on Foxboro's engineering executive and sales product committees.

Chrysler Establishes New Regional Office at Houston

D. D. CHENE

A completely staffed regional office has been established in Houston to assist in the sale of Chrysler industrial and Chrysler marine engines, it has been announced by Clyde C. Williams, vice president of sales for Chrysler Corp. marine and industrial engine division.

D. D. Chene, former sales representative for the southwest area has been named regional manager of the new office.

Officials said that the new regional office will better serve the needs of Chrysler marine and industrial engine dealers, equipment manufacturers in petroleum and other fields.

Worthington Makes Griffin Manager at Cincinnati

Ralph G. Griffin has been appointed manager of Worthington Corp.'s Cincinnati district office, according to an announcement by William A. Meiter, general sales manager.

Griffin joined Worthington in 1930 as a student trainee. Soon after, he served as application engineer at the company's St. Louis district office, and later at the Buffalo district office.

From 1936 to 1953 he worked the

NOW- Available for HIGH PRESSURE SERVICE

VAREC fig. 2500C AUTOMATIC TANK GAUGE

Service in working pressures to 300 p.s.i.g. is offered by the new VAREC Figure 2500C Automatic Tank Gauge. It's a high pressure model of the successful VAREC Figure 2500 Series, equipped with the Neg'ator motor, which eliminates use of counterweight and simplifies installation. This series has been tested by 3 years of service in the Petroleum and Chemical fields, after 2 years of experimental and development work.

An important part of this new model is the magnetic drive, which requires no packing gland or mechanical seal on rotating shaft. The use of stainless steel ball bearing construction throughout provides a combination that reduces friction to a minimum.

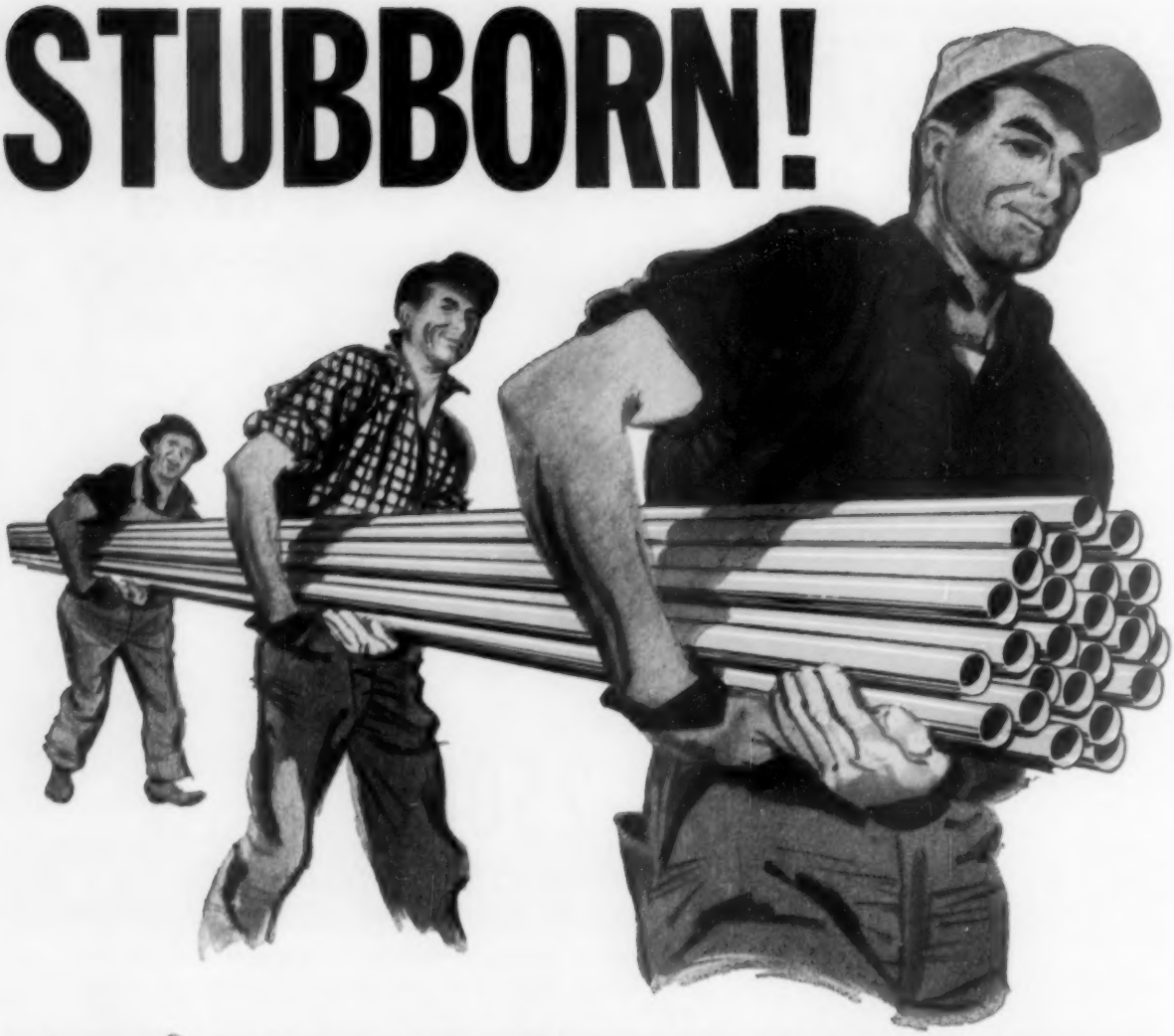
Liquid level indication on a mechanical counter and dial for convenient, easy reading. Components are enclosed in a separate compartment to keep tank vapors from fogging dial. Operation checker is standard equipment.

All the field-tested, desirable features of the VAREC Figure 2500 Series have been incorporated in this new gauge for high pressure service — the Figure 2500C.

Varec

VAPOR RECOVERY SYSTEMS COMPANY
2820 North Alameda Street
Compton 1, California
961-9
Cable address: VAREC COMPTON Calif. (U.S.A.) All Codes

STUBBORN!



Chase® Antimonial Admiralty Heat Exchanger Tubes *RESIST DEZINCIFICATION!*

Dezincification holds no fears for the users of Chase Antimonial Admiralty Heat Exchanger Tubes! For *this* special alloy can give *years* of extra service under the most corrosive conditions!

Rugged testing in Chase laboratories, plus careful manufacturing in Chase mills, team up to give Chase Antimonial Admiralty a longer, healthier life span. To you, this can mean lower operating costs, fewer breakdowns, longer waits between tube replacements.

Enjoy these benefits! Insist on Chase Antimonial Admiralty!

CHASE WAREHOUSE STOCKS: Houston,* Los Angeles, New Orleans, Tulsa**

*Handled by Standard Brass & Mfg. Co. **Handled by Vinson Supply Co.

Chase®

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

Atlanta	Chicago	Denver	Indianapolis	Minneapolis	Philadelphia
Baltimore	Cincinnati	Detroit	Kansas City, Mo.	Newark	Pittsburgh
Boston	Cleveland	Grand Rapids	Los Angeles	New Orleans	Providence
Charlotte	Dallas	Hamilton	Milwaukee	New York	Rochester
St. Louis	San Francisco	Seattle	Waterbury		

Buffalo territory as salesman in general line, merchandising, air conditioning, and refrigeration. In 1953 he became assistant manager of the Cincinnati district office.

Griffin succeeds Earle W. Vinnedge who has been named special representative of the Cincinnati district office concentrating on larger negotiations. Vinnedge has been with Worthington Corp. for 40 years and has served as the Cincinnati district office manager for 28 years.

National Opens Export Branch at Torrance

O. P. LAKE

Rapidly increasing activity of American drilling contractors and oil companies in foreign fields has prompted National Supply Co. to open a branch office at Torrance, Calif., for its export division. The office is intended to be of particular service to California companies that have oil operations abroad and that need assistance in their specialized procurement and shipping problems.

Owen P. Lake is manager of the office and is assisted by A. A. Martin. Lake joined the company in 1923 in the sales-order-control department and was transferred to the export division in 1941. Martin started at the Torrance plant in 1945 and became sales-order-control clerk in 1947.

Fuex Joins Southern Engine

S. G. FUEX

Appointment of S. Gerald Fuex as manager of sales promotion and advertising has been announced by C. A. Leavens of Southern Engine & Pump Co. Fuex formerly served as director of public relations and advertising for Transtexas Airways.

Ethyl Corp. Elects Turner Executive Vice President

Bynum Turner, vice president in charge of research and engineering of Ethyl Corp. has been elected executive vice president, a new position, E. L. Shea, president, has announced.

Turner joined Ethyl in 1946 as assistant to the plant manager at Baton Rouge, La. He was named general man-

RIDGID
2-S
Every RIDGID Pipe Tool
TESTED
individually
before
shipment
Extra Fast...
...easy...pipe reaming
with this self-feeding
RIDGID
Spiral . . . turns into the work smoothly, no chatter. Famous RIDGID heat-treated cutting edges mean clean reaming, extra long service. Quick enlarging of conduit box outlets—and holes in sheet metal. More for your money—buy the 2-S at your Supply House.
for power
and hand reaming . . .
RIDGID
LonGrip
5 long straight flutes ream clean, easy to control.
RIDGID
Work-Saver Pipe Tools
The Ridge Tool Company • Elyria, Ohio • U.S.A.

Photograph by courtesy of Victoria State Railways

BP HAULS THE TRAINS

ON ROADS AND RAILWAYS ALIKE, the power of BP petrol and diesel fuel is helping to move Britain's trade more economically, more efficiently than ever before.

Overseas the story is much the same. Power for trains and for transport by road, air and sea is provided by oil processed in fourteen BP refineries in nine countries. BP products around the world are speeding the pace of progress in commerce, in industry and in the rapidly growing field of private motoring.

The BP Shield is the symbol of the world-wide organisation of

The British Petroleum Company Limited

BRITANNIC HOUSE · FINSBURY CIRCUS · LONDON, E.C.2.

ager of manufacturing in 1949 and elected vice president in charge of research and engineering in 1951. He is a director of Ethyl Corp. and Ethyl Dow Chemical Co.

Union Tank Announces Sales Appointments

BUROUSSARD

Union Tank & Supply Co. has announced appointment of Wilbur F. Buroussard as Houston branch manager; George W. Smith as sales representative in the Dallas region; Elmer R. Simmons as sales and service representative; and Eldon L. Brumbaugh as sales representative.

Buroussard has been with Union Tank & Supply for 2 years as a sales representative in the Houston area. Before joining Union Tank & Supply he was with Macco Oil Tool Co. in Houston.

Smith, previously with Union Tank & Supply 3½ years, is returning after employment as district manager with Murphy Tank Co. in Alice, Tex.

Simmons will be responsible for the sale and service of oil-field and processing equipment in the Lafayette, La., area.

Brumbaugh will be responsible for the sale of oil-field and storage equipment in the Great Bend, Kans., area.

Fanning Represents Rector at Farmington

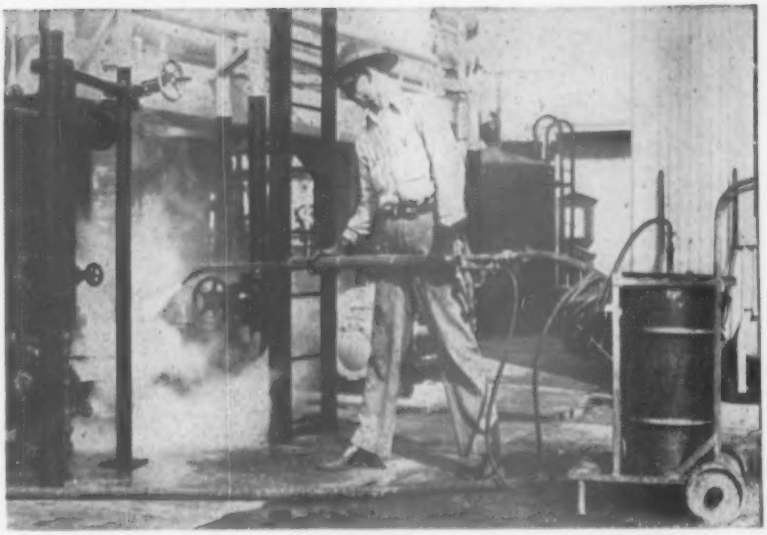
J. B. FANNING

Appointment of J. B. Fanning as sales representative at Farmington, N. M., has been announced by J. L. Pinkard, sales manager of Rector Well Equipment Co., Inc. Fanning has worked on rigs for Schlumberger, Seismograph Co., Texas Co., and Noble Drilling Co. For the past 11 years he has been sales representative for Hughes Tool Co.

Wood Becomes Assistant Manager for Welex Jet

Louis M. Wood, Jr., has been named assistant manager of the Welex Jet Service district office at Abilene, Tex., the oil-well service company has announced.

Wood, who has been with Welex 3 years, started his career in the oil fields



How One Man and a Gun did Two-Weeks work—in a Day!

Oakite Steam-Detergent Gun makes short work of maintenance cleaning for one refinery

The cleaning problem facing one California refinery seemed simple enough. All it involved was removing accumulations of dirt, grease, and muck from tanks, pumps and similar equipment. But when the time required was considered, the job assumed major proportions. It meant tedious scraping, wire-brushing and wiping. It involved struggling with hard-to-get-at surfaces. And it meant utilizing a whole crew for hours of unproductive labor. Could the Oakite Man suggest a faster way?

He could — and he did. He suggested using specialized Oakite detergents — and applying them with the Oakite 384 Steam-Detergent Gun. Light-weight and easy to handle, this versatile cleaning tool enables one man to direct a power-packed jet of heat, detergency and steam at soiled areas and literally blast away grease, grime and soil deposits. The plant superintendent agreed to give it a try.

By that afternoon, he reported that the Oakite Steam-Detergent Gun had enabled one man to do about two weeks work in a single day!

Proving that — it pays to consult Oakite for every cleaning need.

FREE BOOKLET: Like more information about Oakite's modern cleaning methods and materials? Free booklet contains helpful information on drum reconditioning, descaling, salvage cleaning, paint stripping and many other important refinery cleaning chores. For your copy, write Oakite Products, Inc., 44C Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS · METHODS · SERVICE

SCIENCE

Export Division
Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada

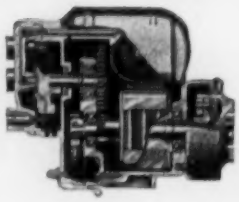
UNLIMITED RUNNING TIME FOR YOUR PUMPING ENGINES

When your pumping engines are equipped with Fairbanks-Morse Super Spark Magnetos be assured they are on the job making money for you day after day. These dependable magnetos are built to deliver efficient, economical and dependable service under the toughest operating conditions—cuts down-time—they rarely need attention or maintenance.

Standardize now on Fairbanks-Morse Super Spark Magnetos and cinch low cost trouble-free performance. See your Fairbanks-Morse service station or distributor or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

ENGINEERED FOR TOUGH SERVICE

- Compact, rugged, self-contained unit—few working parts
- Steady hot spark at all speeds
- Large, long lasting breaker points for quick starts—smooth performance
- Oversize high tension coils—built to take a beating



- Sturdy impulse coupling of simple design for easy starting
- Alnico Super Magnets cast into powerful one-piece magnetic rotor

This is type FM-XOR six cylinder magneto with ball bearings throughout—available in base or flange mounting.

FAIRBANKS-MORSE
a name worth remembering when you want the best

MOTORS • ZC ENGINES • MAGNETOS • PUMPS • DIESELS

PRODUCTS LUCEY CORPORATION

OIL AND GAS INDUSTRY SUPPLIES

PESA
PARTNERS IN PETROLEUM PROGRESS

PRODUCTS LUCEY CORPORATION

LUCEY PRODUCTS CORPORATION
TULSA, OKLAHOMA

as a roughneck. Previous to his promotion to assistant manager, he had been in Abilene as a sales engineer for the company.

Zink Makes Experimental Furnace Available

The use of the new John Zink test furnace by the process industries, without charge, has been announced by John (Jack) Zink, vice president of John Zink Burner Co., Tulsa.

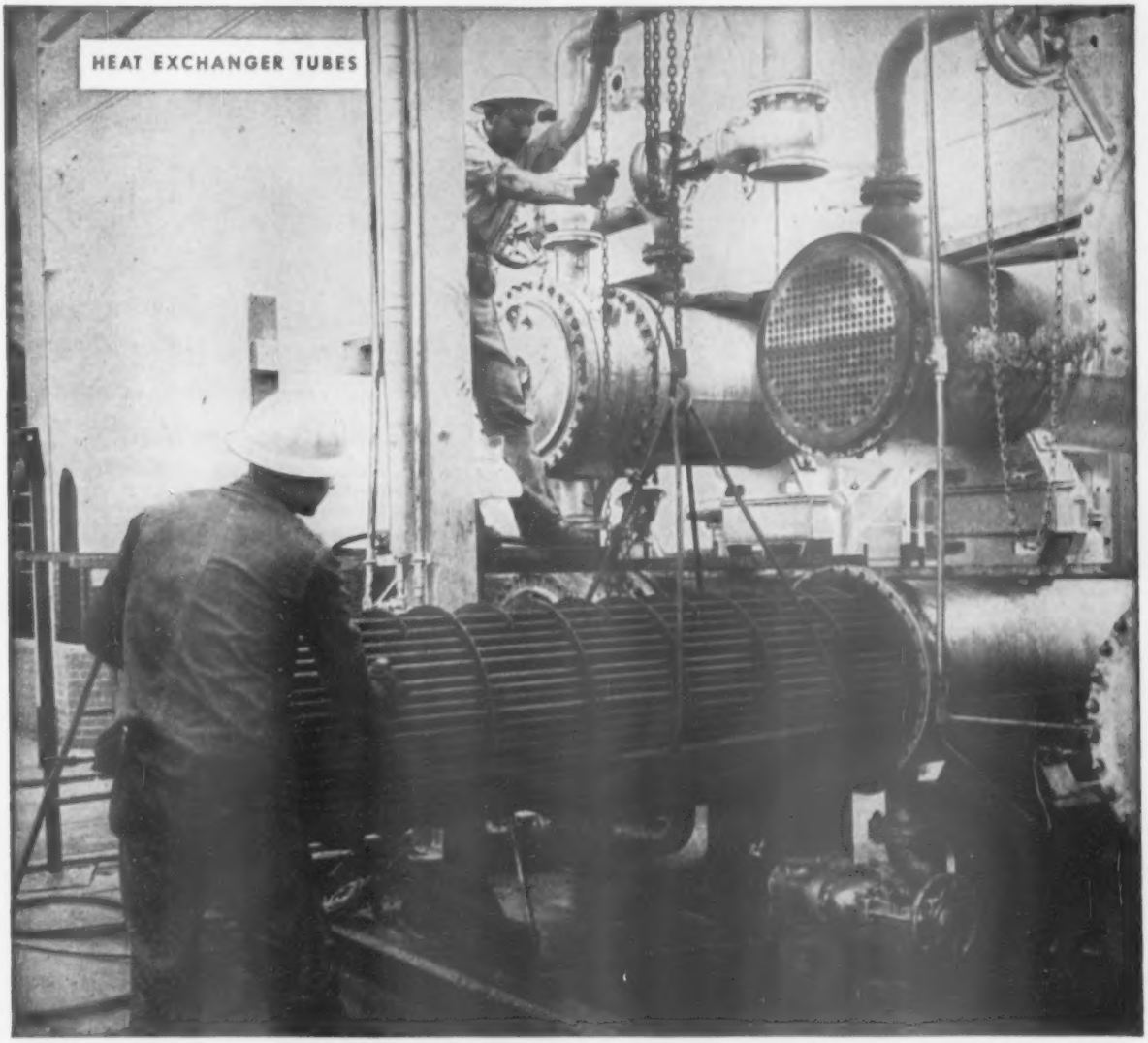
This experimental furnace is designed to permit testing at heat releases from 500,000 to 20,000,000 B.t.u. per hour. The facilities include the following: a completely watercooled furnace; provision for either vertical or horizontal firing; provision for either forced or natural draft firing; automatic boiler capable of delivering 2,500 lb. per hour saturated steam at 150 lb. pressure; heavy Bunker C oil or No. 2 distillate oil; natural gas 1,050 B.t.u. per cu. ft. at 25 psi.; blower for delivery of air; pressure taps into furnace for Orsat sampling; three Pyrex-glass peep holes; electric current; and complete machine shop.

Chicago Bridge & Iron Appoints Three Salesmen

Three personnel appointments have been announced by Chicago Bridge & Iron Co., Chicago.

Robert S. Chamberlin has joined the firm's San Francisco sales office, transferring from the general sales office in Chicago. Arthur G. Albertson has been assigned to the Los Angeles sales office, and Julius D. Holmquist has joined the company's Philadelphia sales office.

Chamberlain joined Chicago Bridge & Iron Co.'s plant in Salt Lake City, Utah, in 1949. Albertson joined the firm in 1952. Holmquist joined the



PERFORMANCE RECORD of these tubes under actual operating conditions is now a part of Anaconda's extensive collection of case histories.

Use of Anaconda Cupro Nickel, 10%-755 Tubes in Texas refinery may answer your tube problem

Imagine a collection of tube performance case histories that can answer many of the corrosion problems you face!

Our files bulge with such a collection. Here is experience accumulated over almost a century. Here are detailed records of tube performance under hundreds of actual operating conditions.

We can put the information in these files to work for you at once—to help you select the one best alloy for your job.

Here's a case history we are now adding—the use of ANACONDA Cupro Nickel, 10%-755* Tubes in the Port Neches Refinery of a major oil producer.

These tubes—in use two years—cool heavy gas oil in an Alco Exchanger on a Crude Pipe Still Unit. Gas oil at about 500°F.—mildly corrosive—comes in contact with the outside of these tubes. Brackish river water—with a high salt content—circulates through the tubes. Yet the tubes show no sign of corrosion.

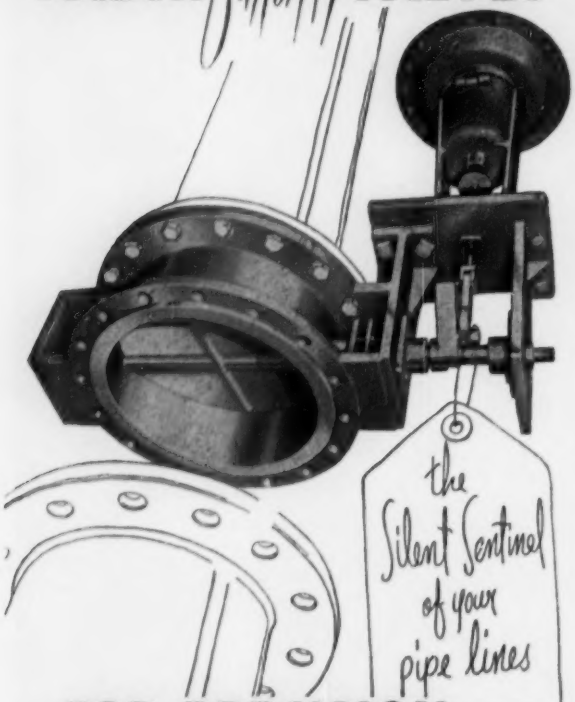
CUPRO NICKEL, 10%-755 resists corrosion almost as well as Cupro Nickel, 30%-702; yet it costs much less. Polluted sea water and sea water with entrained air—even at relatively high velocity—have little effect on this alloy.

Help for your tube problem. No one tube alloy serves best under all conditions. Your problem is one of choosing the right alloy for the job. Let Anaconda's Technical Department help you. Write, outlining your operating conditions, to Dept. TD, *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.*

*U.S. Patent No. 3,074,804 54109

ANACONDA®
Tubes and Plates
for Condensers and Heat Exchangers

FABRI Butterfly VALVES



FOR PRECISION REMOTE CONTROL

Design engineered to meet your specific conditions. Fabri-Valve Butterflys are fabricated to your choice of power actuators and are available in angle seat, wafer or swing through series . . . in sizes 3" to 30". Fabri-Butterfly-Valves are made of stainless steel, monel, nickel or any material or combination to meet your need. Write, wire or call for more information or estimate.

TRADE MARK

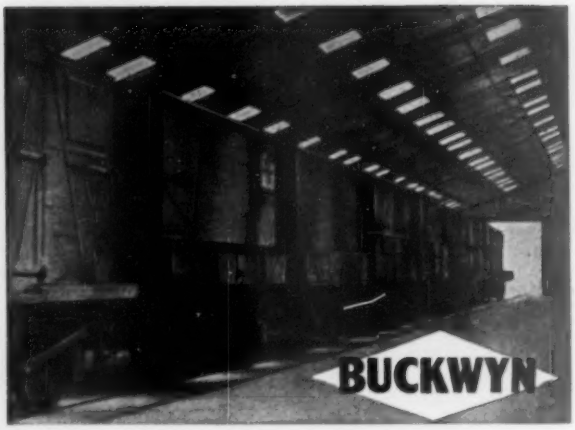
FABRI-VALVE

COMPANY OF AMERICA

2100 N. Albina Avenue, Portland 12, Oregon

FABRI-VALVE DISTRIBUTORS

ALDREDGE & McCABE	Denver, Colorado
CORDES BROTHERS	Wilmington, Calif.
CORDES BROTHERS	San Francisco, Calif.
FELKER BROTHERS	Marshfield, Wis.
THOS. W. MACKAY & SON, LTD.	Vancouver, B. C.
DOUGLAS ROBBINS & CO.	Minooka, Ill.
SOUTHERN CORP.	Charleston, S. C.



The World's most economical warehouse

As adopted by the **British Admiralty, Ministry of Works, Ministry of Supply and Foreign Governments.**

Frame construction in tubular steel and high tensile cable, Buckwyn metal tiled in aluminum or steel with or without **insulation for all climatic conditions.**

Complete buildings from $1 sq. ft. c.i.f. American Ports.

PATENTED BUILDINGS
Areas 10,000 to 50,000 sq. ft.
Spans 63 ft. to 128 ft.

BUCKWYN CONSTRUCTIONS LTD., TWYFORD, BERKS, ENGLAND

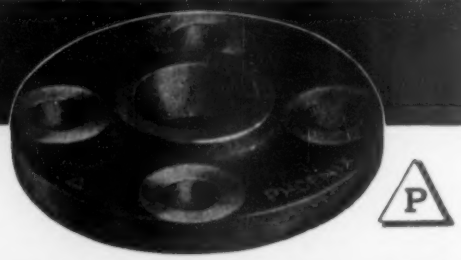
Full particulars from Dept.: 20

Cables Buckwyn, Twyford

BUCKWYN
WINS IN THE RACE FOR ECONOMY

PHOENIX *Drop-Forged* FLANGES MEAN . . .

MAXIMUM STRENGTH



Long life is assured with Phoenix maximum strength flanges. Forged of mild steel, they are available in a wide range of styles and sizes. Meet ASA requirements and ASME and ASTM specifications.

NEW CATALOG!

Send for free brochure showing Phoenix Complete Line.

FLANGE DIVISION
PHOENIX MANUFACTURING CO.
Catasauqua, Pa. • Joliet, Ill.

Greenville, Pa., plant in 1954 and previously was Middle East representative for General Electric X-Ray Corp.

Welex Jet Promotes Haynes To Manage Pampa Office

J. E. (Gene) Haynes has been promoted to the position of manager of the Welex Jet Services, Inc. district office at Pampa, Tex., the oil-well service company has announced. Haynes, who has been with Welex for 3½ years, was, until his recent promotion, assistant district manager at Pampa. He had formerly worked as a rigger, a shooter, and a sales engineer with the company.

Blakey Joins Staff of Century Geophysical

C. W. BLAKEY

Carl W. Blakey has joined the staff of Century Geophysical Corp., Tulsa, as vice president in charge of domestic seismic operations, according to Opie Dimmick, president of Century. Blakey will work under the direction of Ben F. Rummerfield, executive vice president.

Previously, Blakey was a general partner of the Manhart, Millison & Beebe geological-consulting firm. Prior to this, he was president of Petroleum Consultants, Inc., a seismic contracting company. Also, Blakey was associated with Seismograph Service Corp. as a seismic supervisor, having supervised work in most of the oil-producing areas of the United States and in Egypt, Palestine, Iraq, and Iran.

Le Beau Visits Latin America for Wisconsin

Irving Le Beau, export sales manager, Wisconsin Motor Corp., Milwaukee, Wis., has visited Caracas, Venezuela, on the first leg of an extensive business tour of Latin American countries.

Le Beau's itinerary includes visits with Wisconsin-engine distributors in Belem, Manaus, Recife, Salvador, Bahia, Rio de Janeiro, Sao Paulo, and Rio Grande Do Sul, Brazil; Montevideo, Uruguay; Buenos Aires, Argentina; Santiago, Chile; Lima, Peru; Guayaquil, Ecuador; Bogota and Me-

A KERRIGAN
Grating for Every Need
A CATALOG
for every Grating
Write for your
Copy NOW!

STEEL
for the 1001 applications where safety and strength come first. Kerrigan Steel Grating is BONDERIZED for corrosion resistance and extra years of life.

STAINLESS and MONEL
non-magnetic steel for the chemical, oil and packing industries . . . for ANY installation where high resistance to heat, acids, chemicals, and corrosion is needed.

TRULY . . .
In both size and type, there is a Kerrigan Weldforged grating for every need. Let our new catalogs prove it to you. Send for the one you think best answers your need (or ask for ALL FOUR if you wish). We will also be glad to send you a desk-size grating sample. Write Kerrigan Iron Works, Inc., General Sales Office, 274 Madison Ave., New York City.

RIVETED STEEL
where it is desired to match existing grating.

ALUMINUM
spark-proof for those whose need is strength AND lightness. Extra safe and strong. Allowable fiber stress 15,000 psi. Modulus of elasticity 10,000,000 psi.

KERRIGAN GRATING
CUSTOM-MADE FOR YOUR JOB AND SAFE—IT'S Weldforged

THE ONLY TRUCK POWERED SERVICING UNIT WITH

COOPER TR UNIT

FEATURES

Constant mesh helical gear power transfer and hypoid gear 90° drive are completely sealed in oil, run quietly and require no adjustment. ● Only short, low speed chain drives from countershaft to drums are used. ● Better spooling, easier on lines, fewer wearing parts — lines go directly over mast crown without the use of reeving sheaves. ● Legal in weight — Drums are located for proper loading of axles — no excessive loading on truck frames behind cab — no excessive overhang on rear of unit. ● Smooth, uncluttered housing is easy to keep clean. ● Ample bed space (63″) between cab and drums for 5 man cab or other equipment. 43″ from drums to end of bed. ● Air friction drum clutches are self adjusting. ● All controls, including transmission shift, at operator's position. ● Mast equipment — Single pole or double pole pipe masts, and fabricated guyless derricks. ● Built in three sizes: Model TR32 rated 4,500; Model TR36 rated 6,000; Model TR42 rated to 10,000.

UNIT SHOWN IN PHOTOGRAPH —
MODEL TR-42-36

TRUCK — International RF-192 — Motor RD450 (RD501 available).

WINCH: Double drum. Sandline drum brakes 36″ dia. x 6″ face.

Tubing drum brake 42″ dia. x 8″ face.

Brake bands dead end, equalized and lined with 1″ thick blocks.

Air friction clutches.

5 speeds on sandline drum.

10 speeds on tubing drum.

Maximum single line pull on tubing drum 46,000 lbs. without slipping clutch.

LINE CAPACITY: Sandline drum 11,500 ft. of 9/16″ (can be furnished with 42″ dia. x 8″ brakes on sandline drum with capacity of 14,900 ft. of 9/16″).

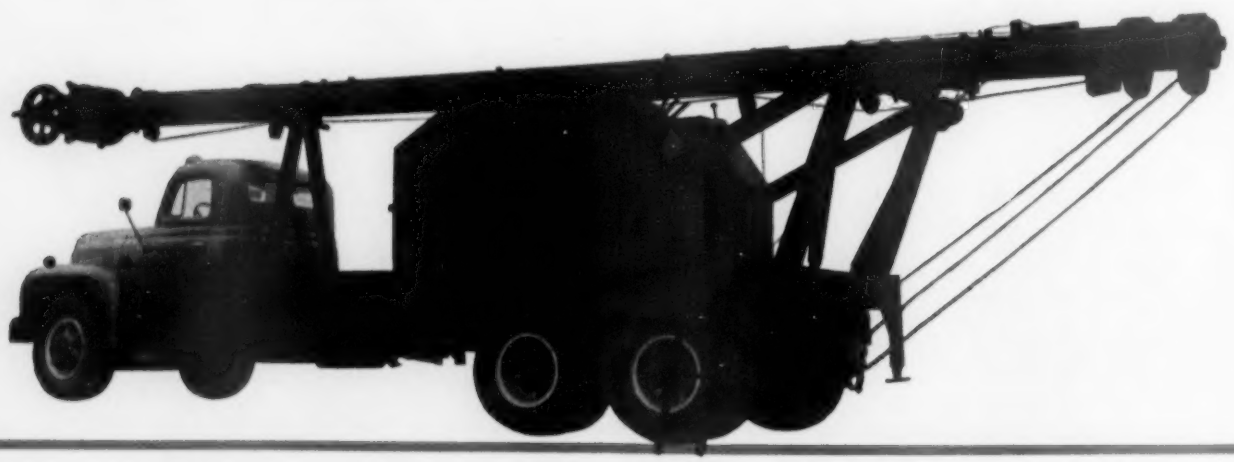
MAST: 65 ft. single pole, 13⅜″ x 10¾″ pipe with three crown sheaves and sandline reeving sheave above crown. Single line raising and telescoping, auxiliary winch at extreme rear for operating mast.

WEIGHT: As shown, total 34,360 lbs. Front axle — 9,160 lbs. Rear axle — 25,200 lbs.

HEIGHT: Overall 10 ft. 8″.

WIDTH: 8 ft. 0″.

LENGTH: 40 ft. 4″.



MODERN ALL GEAR & TORQUE TUBE PRIMARY DRIVE

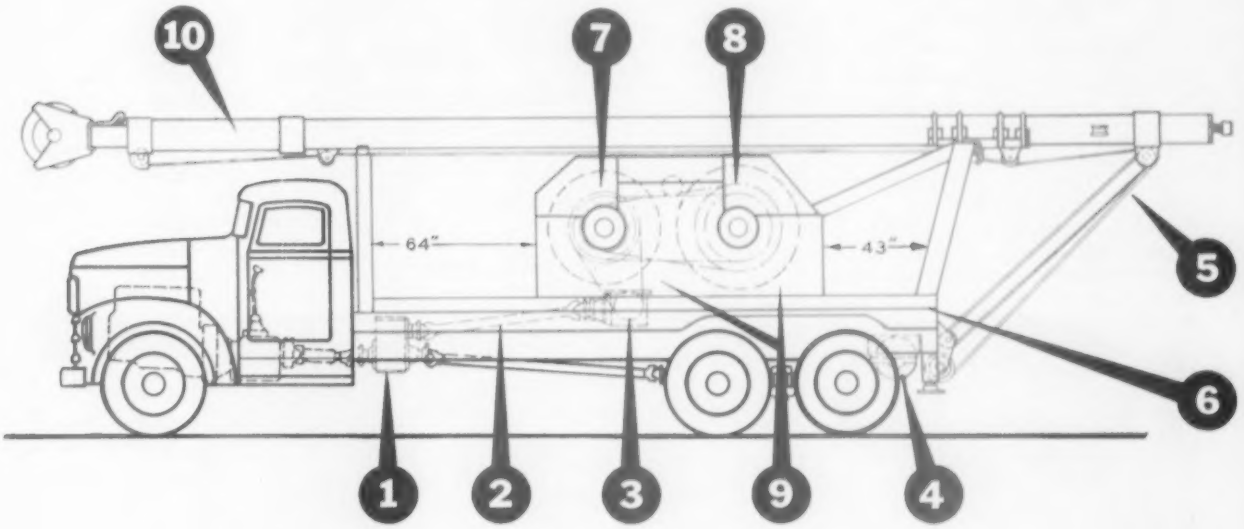
The COOPER TR Servicing Units have been designed to overcome the usual objections to large truck units.

Note on the diagram below that the power is transmitted through gears, torque tube and *short* slow speed heavy chains, actually eliminating chain and sprocket wear, noise and troublesome adjustments.

The load is balanced over the weight bearing axles, permitting higher road speeds and more maneuverability in the field.

Note, that lines go directly from drum to crown of mast leaving rear of bed free of dangerous running sheaves and that ample free bed space is provided in between cab and drum housing. The unit can carry a full crew and tools to the job.

The operator's view of the well head is clear. All clutches are finger tip, air valve controlled. All transmission speeds are conveniently obtainable at operator's position.



1. Constant mesh helical gear power transfer — sealed in oil.
2. Torque tube drive to countershaft.
3. Hypoid gear 90° drive — sealed in oil.
4. Auxiliary winch for operating mast.
5. Mast is raised and telescoped by same line, no lost time spooling line off and on drum.
6. Control position optional for operator, on folding platform or on ground.
7. Five speed sandline drum — Air clutch, self-adjusting.
8. Ten speed tubing drum — Hi-Lo air clutches, self-adjusting.
9. Mechanically equalized Brake Bands lined with API Blocks. One point adjustment.
10. Telescoping single or double pole masts and fabricated guyless derricks.

Write for additional information or ask the Cooper Sales Engineer in your area.

The most complete line of well servicing equipment. There is a proper size and type to fit any depth well or any field condition. You can service them faster, safer and at less cost with a COOPER.

FRED E. Cooper, Inc.

P. O. Box 1890 TULSA, OKLA.

Houston • Odessa • Los Angeles

AT LAST . . . .
A STANDARD PIPE ANCHOR

Bos-co
UNIVERSAL
PIPE ANCHOR

- Less expensive than special strap anchors.
- Handier; no more waiting to have anchors made.
- Pipes of same size can be stacked and valuable space saved.
- Adaptable for many uses.

Available At Your Supply Store

Bos-co
EQUIP'T ENG'R'G & MF'G.
936 South Boulder Ave., Tulsa, Oklahoma

RATIGAN

NO. 219 WIRE LINE CLAMP
NO. 220 SHOCK ABSORBER

The No. 219 clamp is regularly used on deepest wells. It is designed for any trunnion type pumping unit and will take any size wire line from ⅝" to 1¼".

The No. 220 is a combination carrier bar and shock absorber designed for pumping units of limited width and head room.

This Ratigan combination makes an ideal unit—unsurpassed for safety, efficiency and economy of operation.

SOLD THROUGH LEADING SUPPLY STORES

J. P. RATIGAN, Inc.
1213 Santa Fe Ave., Los Angeles 21
Export: National Supply Co., Inc., Export Div.
600 Fifth Ave., New York 20, N.Y.

dellin, Colombia; Panama City, Panama; Mexico City and Monterrey, N. L., Mexico.

Fischer & Porter Names Rich Petroleum Coordinator

Frederick S. Rich, formerly senior instrument engineer for Arabian American Oil Co., has been appointed petroleum-industry coordinator for Fischer & Porter Co., Hatboro, Pa. Rich has had 22 years experience in instrumentation, 20 of which have been in the petroleum industry. Before joining Arabian American Oil, he was senior instrument engineer for Arthur G. McKee & Co. and prior to that was instrument supervisor for Carbide & Chemical Co. at Oak Ridge. He also worked at Aruba, N.W.I., for Standard Oil Co. of New Jersey for 4 years.

Sales Representative Is Added to Atlas Pipe Staff

Roger E. Bartelsmeyer has joined Atlas Pipe, Inc., as sales representative in Corpus Christi, Tex.

For the past 5 years Bartelsmeyer has been with National Tube Division of United States Steel Corp. His headquarters will be at the major plant of Atlas Pipe in Houston.

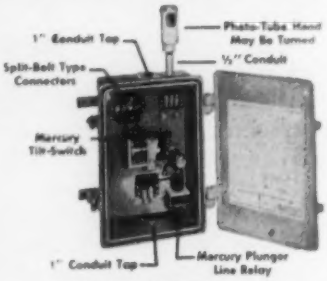
Hamer Valves Appoints French Representative

Hamer Valves, Inc., Long Beach, Calif., and Joshua Hindle & Sons, Ltd., Leeds, England, licensed manufacturer of Hamer valves, jointly announced the appointment of Societe d'Etudes Petrolieres as exclusive selling agent for Hamer products in France and French possessions. Societe d'Etudes Petrolieres will also assist with representation and sale of Hamer products in Spain, Italy, Holland, Switzerland, Belgium, Luxemburg, Western Germany, Yugoslavia, Norway, and Sweden.

Arrangements for the representation were completed with Roger Henquet, general manager of Societe d'Etudes Petrolieres and W. Gomersall, managing director of Joshua Hindle & Sons, Ltd., by Maurice E. Holladay, vice president of Hamer Valves, Inc., during his recent trip to Europe.

Founded in 1952, Societe d'Etudes Petrolieres currently acts as consultant to various European oil companies in the field of petroleum exploration and production. They also represent a

the ANSWER to
greater flexibility and simplification of installation — a combination Photo-Electric Control & Beacon Flasher



Model LC 2074 Tower Lighting Control Unit

Three Models: for two, three, four, and five light level categories.

Models LC 2072 and LC 2073 provide for alternate flashing of two beacon levels.

Write for Bulletin HPS-135

HUGHEY & PHILLIPS, INC.
Manufacturers of
300MM Code Beacons, Obstruction Lights, Photo-Electric Controls, Beacon Flashers, Microwave Tower Control & Alarm Units, Remote Lamp Failure Indicator Systems, and Complete Tower Lighting Kits.
3300 North San Fernando Blvd.
BURBANK, CALIF.

M-SCOPE PIPE FINDER

"ELECTRONIC WITCH"
HEAVY DUTY PERFORMANCE
$162.50
WITH BUILT-IN "A" AND "B" BATTERY CHECKERS $12.50 EXTRA
FREE LITERATURE

FISHER RESEARCH LAB., INC.
PALO ALTO CALIF

ALLOY STUDS
to your
specifications

For better alloy fastenings, try VICTOR—over 30 years of service to the petroleum industry. Prompt quotations furnished.

Ask for the new VICTOR catalog

VICTOR PRODUCTS CORP.
2635 W. BELMONT AVE. • CHICAGO 18, ILL.

FOR HIGH PRESSURES . . .

One of these will simplify your line hookup . . .

AMERICAN IRON STANDPIPE & MANIFOLD FITTINGS

Designed and manufactured to operate efficiently under extreme high pressures. American Iron fittings are tested to 4000 pounds hydrostatic pressure. Manufactured in a variety of versatile designs, fittings are adaptable to manifolds of any construction and are available in welded type or with standard threaded connections.

AMERICAN IRON & MACHINE WORKS CO. — MANUFACTURERS OF OILFIELD EQUIPMENT — OKLAHOMA CITY U.S.A.

amf

4 GALLON PETROL CAN MAKING & FILLING PLANT for sale

BLISS AUTOMATIC PLANT,

complete for Making, Filling and Capping

4 Gallon (Imperial) Petrol Cans.

All joints soldered, panelled sides, tops and bottoms. Newman type cap. Cans fitted with wire handles and cleats.

OUTPUT 20,000 PER 8 HOUR DAY

Immediate inspection under ideal working conditions in Wales

We would **DIVIDE AND SELL AS TWO SEPARATE PLANTS** each with output of 10,000 cans per 8 hr. day.

Codewords: as one plant, **SMBFU**
as two plants, **SMBGA**
Complete details, photos, etc. from—

F. J. EDWARDS LIMITED, MACHINERY MAKERS,
359-361, Euston Road, London, N.W.1. England
Phones: Euston 4681 or 3771. Cables: Boscotools London

Only KINZBACH

Automatic Mud Relief Valves provide complete protection for personnel and equipment.

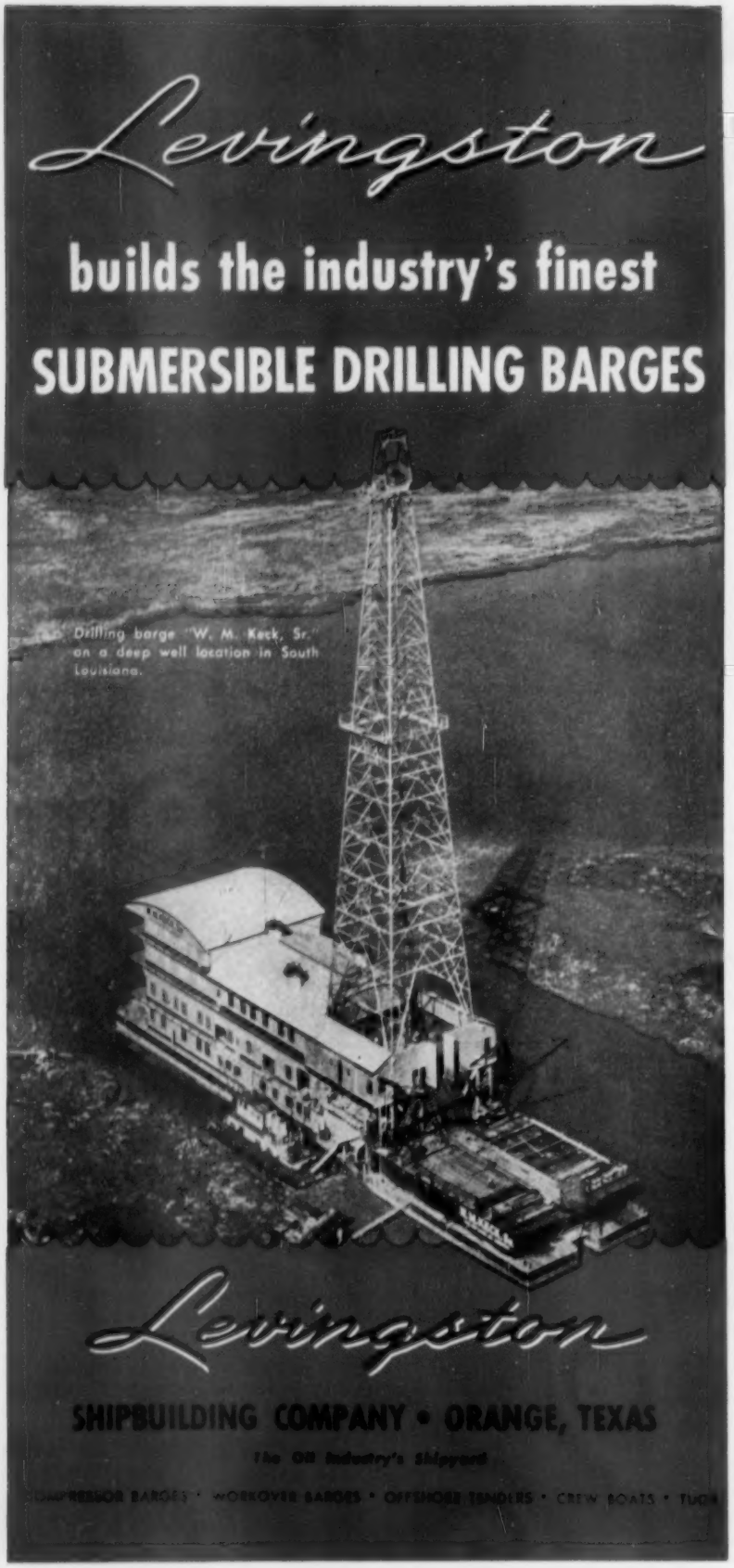
Modern drilling practices demand the complete protection offered by the Kinzbach Model 112 Valves. They open automatically and instantly when the line pressure goes beyond safe limits—and when the pressure drops to a predetermined level, they close automatically.

Write today for complete literature or order through your supply store. Available in 2" and 3" sizes, from 500 p.s.i to 4500 p.s.i.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.
P. O. Box 277 Houston, Texas

Export Office:
74 Trinity Place, New York, N. Y.


Levingston
builds the industry's finest
SUBMERSIBLE DRILLING BARGES
Drilling barge "W. M. Keck, Sr." on a deep well location in South Louisiana.
Levingston
SHIPBUILDING COMPANY • ORANGE, TEXAS
The Oil Industry's Shipyard
COMPRESSOR BARGES • WORKOVER BARGES • OFFSHORE TENDERS • CREW BOATS • TUGS

number of major American companies manufacturing equipment for the petroleum industry. The current list of American firms that Societe d'Etudes represents includes Halliburton Oil Well Cementing Co., Eastman International Co., and Chiksan Export Co.

G. Cance, technical director, and C. G. Magne, will be directly in charge of the new department formed to handle the Hamer and Hindle-Hamer products.

Wilbur Joins Weatherford As Public Relations Head

Glen E. Wilbur, formerly of the petroleum extension service at the University of Texas in Austin, has joined Weatherford Oil Tool Co., Jess E. Hall, Jr., president of Weatherford, has announced. Wilbur will assume duties as public relations director.

Wilbur has been active in oil-industry training work for the past 3½ years at the petroleum extension service. While at the University of Texas, in connection with the A.P.I., he directed 11 training films on drilling and producing oil wells. He also helped produce a cost guide for tool pushers for the A.A.O.D.C.

Prior to his joining the petroleum extension service, he administered training programs for the Sun Oil Co.

Bechtel Uses Wheeled Tractor on T.G.T. Spread

Bechtel Corp. of San Francisco recently purchased this Clark-Michigan loader specially equipped for pipeline construction. The special equipment consists of a removable counterweight feature and side boom and hoist that can be raised and lowered by cables powered by side mounted winches. This complete unit was purchased from Buran Equipment Co. of Oakland, Calif., and is now being used on a Bechtel pipeline contract for the Tennessee Gas Transmission Co.

Dugan Represents United States Motors at Houston

Jack Dugan, formerly southwestern field engineer for Cook Electric Co., Chicago, has been appointed southwestern district manager for the United States Motors Corp., Oshkosh, Wis. His office will remain in Houston, and he will work with United States Motors Corp. dealers and distributors throughout the states of New Mexico, Texas, Oklahoma, Arkansas, and Louisiana.

Walker Well Heads Starts Construction of New Plant

Walker Well Heads, Inc., Tulsa, has started construction on a new plant and office building to be located in Sand Springs, Okla.

The modern new building will provide for 9,040 sq. ft. of floor space, more than 19 times the original space occupied by the firm when it was organized 5 years ago.

The building is 48 ft. wide and 80 ft. long and its construction will be the fifth expansion for Walker Well Heads.

Pinion Joins Atlas Pipe as Salesman-Pilot

Sidney Pinion has recently joined Atlas Pipe, Inc. as saleman-pilot. He was originally employed by the International Supply Co. and retained by Bethlehem Supply when Bethlehem bought International Supply.

The company's headquarters are in Houston, with branches at Corpus Christi, Tex., and Los Angeles, Calif.

S. A. Guerrieri Is Named To Lummus Technical Staff

S. A. Guerrieri has been appointed to the technical staff of Lummus Co., New York, designing engineers and constructors for the petroleum and chemical industries. The announcement was made by J. F. Thornton, president of the firm.

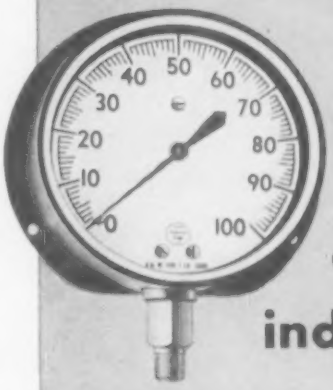
Guerrieri, who at one time was a member of Lummus Co.'s process engineering department, was later a professor of chemical engineering at the University of Delaware and most recently was chief process engineer of Arthur G. McKee & Co.

Guerrieri will be concerned with general technical liaison with licensor companies, as well as participation in

an ACCO product

Helicoid Gages

Why HELICOID is the Quality Gage for every pressure indicating service



Acaloy Case Helicoid Gage
Suitable for tap water, steam, inert gases, oils, coal gas and many chemicals.

Helicoid Chemical Gage
Suitable for chemicals and other viscous liquids which might corrode or clog Bourdon tube.

Built RIGHT

Exclusive HELICOID gearless movement. Bourdon tubes of maximum endurance life. Gives highest degree of *sustained accuracy*.

Stay RIGHT

No gear teeth to wear out. Convenient external pointer adjustment. Protected from sudden overpressure or pressure reduction.

Sold RIGHT

Experienced HELICOID gage engineers are available to help you choose the gage you need. Distributors are conveniently located. Write for the name of the one nearest you.

Acaloy Square Flush Case
This is a weather-proof case and ideal for use in symmetrical panels.

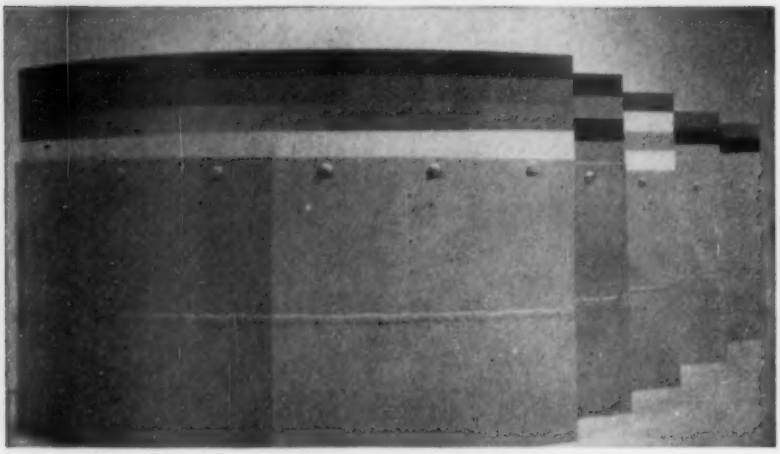
ACCO

Helicoid Gage Division
AMERICAN CHAIN & CABLE
929-A Connecticut Avenue • Bridgeport 2, Connecticut

for Better Value

NOW AVAILABLE FROM GLIDDEN: Job-tested, anti-corrosive,

PAINT FINISHING SYSTEMS



TYPICAL PAINT FINISHING SYSTEMS: Here are a few of the Glidden finishing systems which have been field tested and are outstanding for combating corrosion and cutting metal maintenance costs.

New Glidden job-tested finishing systems offer you the most durable, anti-corrosive protection ever available. A special system has been developed for every type of corrosion problem and every climatic condition. Two developments make this possible.

1. **New highly anti-corrosive finishes.** These finishing systems utilize the new Vinyls and NU-PON (epoxy) coatings. They have excellent chemical resistance and are outstanding for hardness, toughness and adhesion.
2. **Field-tested finishing systems.** These systems take the guesswork out of buying anti-corrosive finishes. They provide you with the right number of coats and the right finishes for every condition. You don't have to use four or five coats when two will do, and you don't have to use expensive anti-corrosive paints when they are not required.

Glidden *Professional Finishes*

The Glidden Company • Maintenance Finishes Division • Cleveland 2, Ohio

HAVE A GLIDDEN TECHNICAL SERVICE MAN GIVE YOU A NO-COST, NO-OBLIGATION,

PAINTING ANALYSIS OF YOUR PLANT NEEDS

Fill in and mail to The Glidden Co., Dept. GJ-1155
11001 Madison Ave., Cleveland 2, Ohio

I am interested in complete details of
☐ Glidden Finishing Systems
☐ Glidden Painting Analysis

I am particularly interested in
☐ Vinyl type coatings
☐ NU-PON (epoxy) coatings
☐ New Glidden Maintenance Products Catalog

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

the general advisory and consulting functions of Lummus' technical staff department.

Oilwell Shifts Bope To Fort Morgan Area

Appointment of Lynn E. Bope as field representative for U. S. Steel's Oil Well Supply Division at Fort Morgan, Colo., has been announced by R. L. Armstrong, manager of Oilwell's Rocky Mountain area.

Bope was employed by Oilwell in 1953 at its Casper, Wyo., store. Later that year he was transferred to Fort Morgan, where he was located at the time of his appointment as field representative there.

A-C Makes Craggs Assistant Sales Manager at Dallas

L. D. Craggs has been appointed assistant construction machinery sales manager at the Dallas branch for the construction machinery division, tractor group, Allis-Chalmers Manufacturing Co.

Craggs was with the Baker Manufacturing Co. in the Dallas territory when it was acquired by Allis-Chalmers early this year. He started with the Baker Co. in 1947.

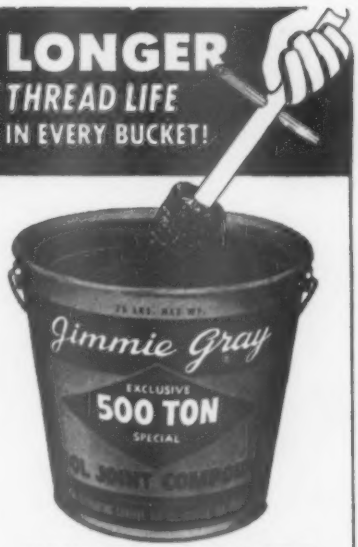
L.O.F. Names Dearborn As Regional Distributor

Dearborn Chemical Co., Chicago, is a recently appointed regional distributor for Blue Flag pipe wrap, a product of L.O.F. Glass Fibers Co., Toledo, Ohio, according to an announcement made by R. F. Carr, Dearborn's executive vice president, and C. F. Hegg, vice president of L.O.F. Glass Fibers.

Used as a reinforcement for corrosion-protective coatings on underground pipelines, Blue Flag pipe wrap is a thin, porous mat composed of a jackstraw arrangement of individual filaments of glass fibers reinforced by parallel strands of continuous filament glass yarn, bonded into a uniform sheet. The porous mat is spiral wrapped and pulled into the bituminous coating as it is being applied to the pipe, reinforcing the coating much as steel rods reinforce concrete.

The acquisition of distributor rights for the glass-fiber wrap marks another forward step in Dearborn's extensive experience in corrosion-protective covering for underground pipelines. Founded 48 years ago, Dearborn Chemical Co. has focused its attention during the last 35 years on improved protective coating methods and products for preventing deterioration of major crosscountry pipelines.

LONGER
THREAD LIFE
IN EVERY BUCKET!



MONEY BACK GUARANTEE

MONEY BACK GUARANTEE

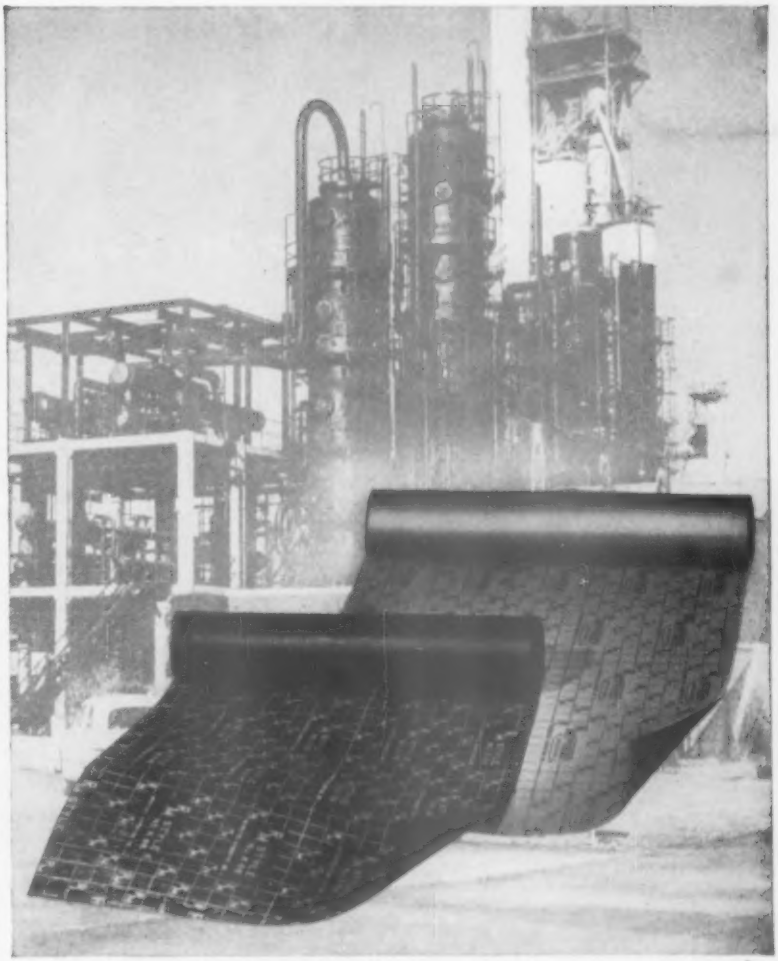
Sold through your favorite supply store

Use JIMMIE GRAY Dope Brushes!

PETROLEUM DISTRIBUTING COMPANY

BOX 203 · HOUSTON, TEXAS · CHarter 5648

Quality Oil Field Lubricants Available in LA. · MISS. · TEX. · N.M. · N.D. · WYO.



LET THESE R/M SHEET PACKINGS REDUCE YOUR MAINTENANCE COSTS

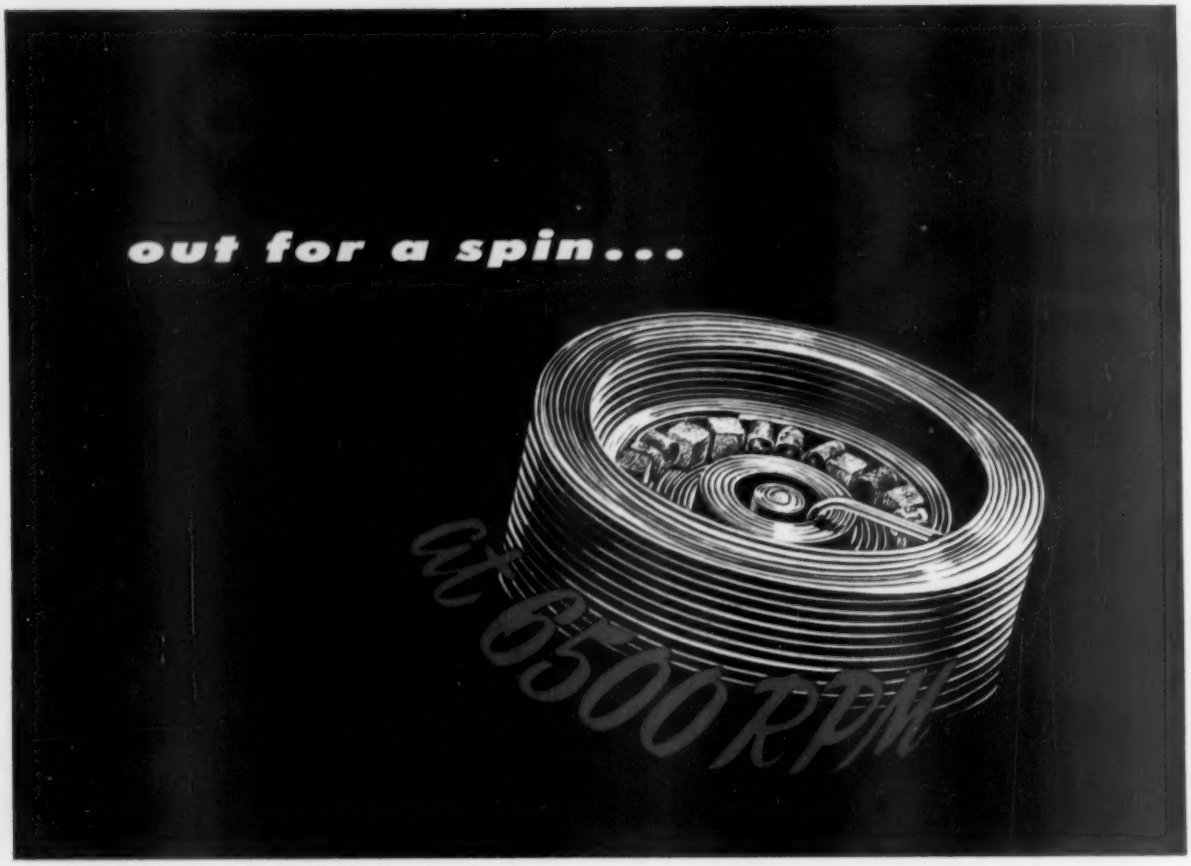
Both of the sheet packings shown above have proved their ability to meet the needs of the petroleum industry. Specify them when you order from your distributor and you will get the quality performance you want. **R/M No. K-68**® is for sealing petroleum products and solvents of the gasoline and aromatic types. **R/M "Pyroid"**® **No. 650** is for sealing oil, steam, acids, alkalies, gasoline-type solvents, and oils at high temperatures. The construction of both is truly homogeneous—providing a dense but pliable sheet of exceptional tensile strength.

R/M MAKES A COMPLETE LINE OF PACKINGS AND GASKETS—AVAILABLE FROM YOUR R/M DISTRIBUTOR

R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, PASSAIC, N.J.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls



Finding better solutions to the problems of reservoir evaluation and the refinement of these answers for economically feasible application is an endless process. Constant changes in drilling, completion, and production practices directly influence formation and fluid analysis procedures.

For example, as more wells are completed in very tight zones, the time required to obtain permeability and porosity data and its degree of accuracy have become critically important.

Aided by industry experiments, a Core Lab approach to these reluctant reservoirs is a new type centrifugal extractor designed to rotate up to 6500 RPM, forcing hot solvent to sweep out the residual oil and water content of small typical permeability plug samples. The net result — *more oil extracted in one-half hour than has been heretofore possible in one week by other methods. Greater accuracy and better service at less cost to the client.*

Core Lab's Research and Development Department accepts not only the new and unique problems of reservoir behavior but also maintains a constant program of improving its own standardized techniques and procedures. Combined with a growing back-log of experience contributed by thirty-two permanent area laboratories, this progressive attitude means more reservoir revenue for the industry through better reservoir engineering.

RESEARCH AND DEVELOPMENT DEPARTMENT

CORE LABORATORIES, INC.

801 CORE STREET, DALLAS, TEXAS

CORE LAB

PETROLEUM RESERVOIR ENGINEERING

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER, TULSA, FORT WORTH, WICHITA FALLS, SHERMAN, OKLAHOMA CITY, ARDMORE, BARTLESVILLE, PAMPA, ARKANSAS CITY, GREAT BEND, NEW ORLEANS, SHREVEPORT, HATTIESBURG, LAFAYETTE, DENVER, BAKERSFIELD, CASPER, BILLINGS, WORLAND, STERLING, EL DORADO, LUBBOCK, FARMINGTON, LOVINGTON, MONAHANS, SAN ANGELO, CALGARY, EDMONTON, REGINA

EXPLORATION

Oklahoma Still Springs Pleasant Surprises

by Frank J. Gardner

MID-CONTINENT oil finders met in Oklahoma City last week. At least they confronted each other. To say that there was a meeting of the minds would be stretching a point. Officials of the Mid-Continent Section of the A.A.P.G. provided the speakers with a well-staged, closely timed forum. But, with a few notable exceptions, the speakers approached their subjects with something akin to reverence, some even with awe. Definite conclusions were as rare as jellyfish bones, and the shrugged shoulder and lifted eyebrow became the identifying badge of a delegate.

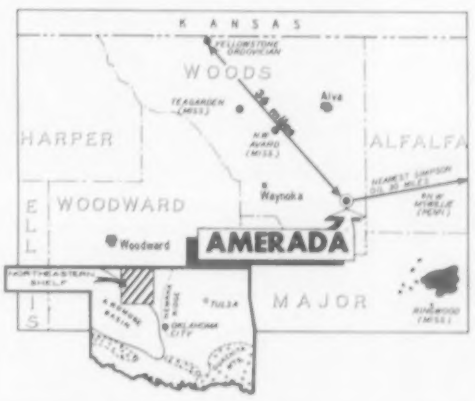
The solving of a mystery . . . But the impact of the meeting was not lost. The seeming confusion and the wavering deductions that floated through the meeting hall finally fell through one's hair and left a feeling of exploratory hope. For it was evident that Oklahoma, oil matriarch of the Mid-Continent, still offers many a geological mystery to the oil hunter. The fact that geologists are solving, or attempting to solve, those mysteries, and with considerable success discoverywise, is a credit to the profession and a cheerful omen of important future oil and gas reserves.

Much of the discussion at this meeting centered around the Anadarko basin—its structure and its stratigraphy. The past 2 years have seen many important new fields, both oil and gas, opened in the basin's western reaches, centering in the Texas and Oklahoma panhandles. Anadarko geologists are making valiant efforts to better understand the tectonic and stratigraphic history of the entire basin as a prelude to more successful oil finding. That they are confused and at variance in their opinions is a healthy sign of progress. More tangible signs of progress are the many discoveries that have been and will be made, not only in the western basin, but on its northeastern shelf area as well.

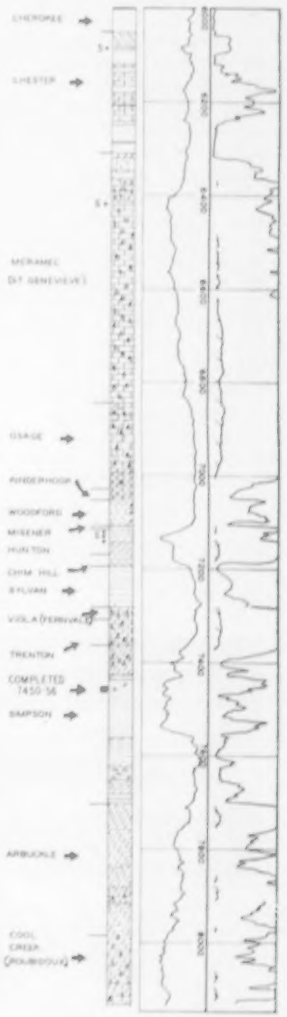
And accepting of a doctrine . . . If we are to accept the Knebel doctrine that 70 per cent of our oil has been found on the stable sides of basins, then surely the Anadarko northeastern shelf and hinge area must hold great hope for major fields. Most Anadarko fields to date lie on the mobile southern and western rims, but if history a la Knebel repeats itself, those basin edges are destined to be overshadowed by discovery events across the basin.

Typical of these discoveries to come is the one illustrated here. In southeastern Woods County, Oklahoma, Amerada Petroleum Corp. recently completed its 1 Farris for a flowing 285 bbl. per day of 49.1°-gravity oil from Simpson-Ordovician sand at 7,450-56 ft. Located in Section 21-24n-13w, this discovery lies 36 miles southeast of the nearest other Ordovician (Arbuckle) production at Yellowstone field, and 30 miles southwest of the Simpson-Ordovician producers in Grant and Garfield counties. Yellowstone field was 1953's most important Oklahoma strike, and was a potent force in drawing attention to the producing capabilities of the Ordovician rocks on the shelf. Since that discovery, two other Woods County fields (Teagarden and Northwest Avard) have proved Mississippian production along the shelf. These developments, together with Simpson strikes of recent years in Grant and Garfield counties, emphasize the regional importance of the northeastern shelf rocks in our future oil reserve picture for Oklahoma.

Will mean new search . . . Oklahoma never ceases to astonish the oil finder. After half a century of exploration and production, it continues to offer vast areas of search. Its potentialities appear to be almost inexhaustible. Small wonder, then, that Mid-Continent geologists have a strong respect for the unknown promise of the Anadarko, still a sparsely tested basin. Small wonder that they eye the McAlester basin, the Ouachita frontal belt, and the stratigraphic jungle of the panhandles with optimism. They cannot yet **explain,** but can only **state** what they know of the economic implications in those areas. When they reach the point of explanation, credit will be due such studies as those discussed at Oklahoma City.



Amerada's Simpson-Ordovician discovery in Woods County, Oklahoma, emphasizes the increasing importance of the Anadarko basin's northeastern shelf to Mid-Continent oil finders. Log of the discovery well shows completion level and other stains and shows found. (Log by American Stratigraphic Co., Oklahoma City.)



Over
50
Locations in the United States and Canada

McCullough® REPORTS TO THE OIL INDUSTRY

Service
Anywhere Anytime

New Services • • • New Tools • • • New Methods • • • Outstanding Results

Combination Magna-Tector and String Shot Back-Off Recovers 3431′ of Crooked Pipe in One Run

While McCullough's "One Trip Back-Off Service" is not yet available in every branch area, the many branches equipped to render this valuable service report the successful completion of some difficult back-off operations.

In this instance 3431′ of crooked drill pipe was recovered in one run in the hole. However, of greatest value to the operator was the fact that the Magna-Tector indicated that pipe could not be recovered from the lowest free point.

Operator was drilling below 3600′ with 4½″ O.D. drill pipe and 6″ O.D. drill collars when pipe became stuck. While attempting to free the pipe, the string parted about 100′ below the surface and dropped to bottom causing it to become corkscrewed and crooked.

After taking hold of the fish, McCullough's Magna-Tector was worked down the pipe and established a definite free point at 3609′ at the top of the drill collars. However, after double checking, it was found that torque could not be applied to the crooked drill pipe below 3440′. Therefore, the String Shot Back-Off was fired at the first collar that would back-off at 3431′. Only one shot was required and the free pipe was recovered from that point. The successful completion of this difficult operation required only one trip in the hole and saved the operator considerable time and money.

Check with your nearest McCullough service location about McCullough's "One Trip Back-Off Service." It is available in an increasing number of areas.

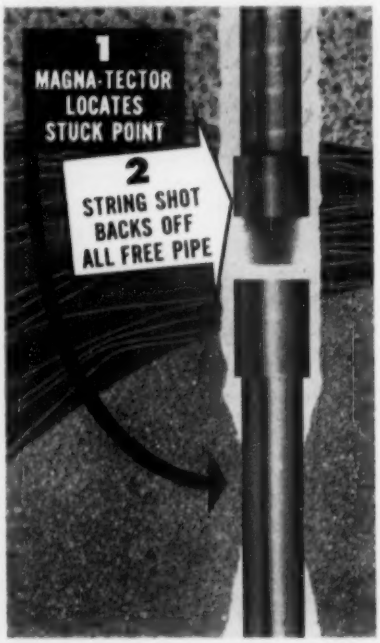
Magna-Tector, String Shot Back-Off Recover Stuck Pipe from 12,200′

High Efficiency and Small O. D. of McCullough's Magna-Tector and String Shot Back-Off Permit Recovery of Full String of 2⅞″ Drill Pipe

Substantial rig time and fishing expense were saved by McCullough's Magna-Tector (Free Point Finder) and String Shot Back-Off in recovering this string of small diameter drill pipe.

The operator was running in the hole with 2⅞″ drill pipe and was only 90′ off bottom when the drill pipe parted 200′ below the surface, dropping the entire string.

McCullough Tool Company ran in with a socket and took hold of the parted pipe. Following this, a String Shot Back-Off was run which backed off the pipe two joints below the socket.



McCullough Magna-Tector and String Shot Back-Off locate the lowest point from which pipe may be recovered and loosen all free pipe in a matter of hours compared to the days needed by mechanical methods.

And, the "One Trip Back-Off Service" will save an additional 50% in rig time in the areas in which it is available.

Socket was removed and operator ran back in and screwed into the fish. After working the pipe a short time it again parted, this time at about 300′.

Again, a socket was used to catch the fish and the McCullough Magna-Tector was worked down to two joints above the drill collars at a depth of 12,200′ where it found the pipe to be free. It was necessary to pull maximum strain on the 2⅞″ drill pipe to straighten out the crooks so the Magna-Tector would go down.

A String Shot Back-Off was fired at 12,200′ and the pipe was recovered from that point.

Both the McCullough Magna-Tector and String Shot Back-Off are long, thin tools. Their small diameters permit them to operate through any tool or pipe that has as little as a 2″ fluid passage. In this instance these tools were worked through approximately 12,000′ of 2.026″ I. D. drill pipe which had been bent and kinked by a 90′ drop.

Two Bulletins Available

1. No. 401 covers the McCullough Magna-Tector and String Shot Back-Off as individual tools.
2. No. 402 covers McCullough "One Trip Back-Off Service" featuring the great new combination of the Magna-Tector and String Shot Back-Off Tool.

Write to McCullough Tool Company, 5820 South Alameda Street, Los Angeles 58, California.

McCullough® TOOL COMPANY

Cable Address: MACTOOL

LOS ANGELES
HOUSTON
EDMONTON

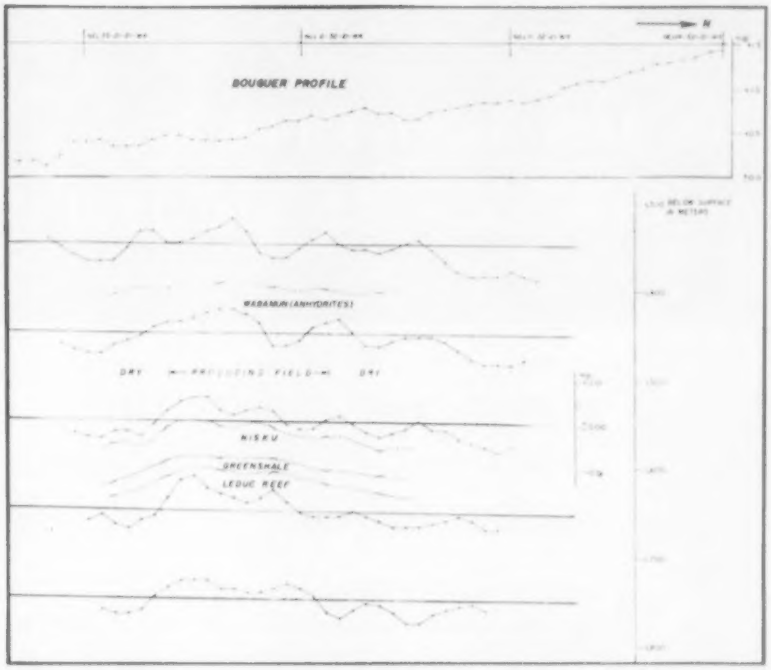


Fig. 1—The Bouguer profile (uper cross section) shows the regional increase in gravity to the north. When this regional effect is eliminated, the local maximum over the field is apparent.

Can Gravity Surveys Map Subsurface Structures?

. . . The author says yes, and cites two examples in Alberta

by Dr. W. F. Stackler
Consulting Geologist, Calgary

EXPERIMENTAL results show that it is possible to prospect structurally using gravity profiles in the foothills area and the reef area of Alberta.

When adopting gravity methods to field practices, we must keep in mind:

1. The profile must run at about right angles to the structure.
2. The stations must be spaced closely together (about 200 m.).
3. The stations must be repeated carefully in order to achieve an accuracy of 0.01 milligals.

The cost of the above profile work will be about $200 to $225 per mile.

This paper presents the actual gravitational field results over Erskine and Turner Valley oil fields in Alberta. Erskine is an example of reef structure of Leduc age, while Turner Valley covers structural oil traps of anticlinal and fault origin which includes all foothill structures.

Necessary conditions . . . The conclusions drawn from my former theoretical experiments indicate that it is possible to separate gravitational effects in zones of depth. The field experiments that have been conducted go to prove the gravity meter is able to obtain results under heterogeneous density distributions and difficult topographical conditions. Erskine field is chosen because of the density contrast between the Green shale and reef of Leduc age.

Turner Valley field shows the gravity effect of an anticline and fault structure in the foothills area where topographic conditions are unfavorable and where terrain correction would cause maximum error. Therefore, this correction must be computed very carefully in order to obtain an accuracy of 0.01 milligals.

Reef prospecting . . . In both experiments, correct density estimations were not available. We had to be satisfied with data taken from similar formations. For the density contrast between Green shale and reef of Leduc age, we found very good estimations from the area north of Edmonton with Green shale 2.674 and 2.738. Therefore, we can expect the Erskine reef field as a gravitational maximum. But it should be noted that such a favorable contrast does not always exist.

Searching for reefs with the gravity meter involves thorough consideration about the probable density contrast. We have to distinguish between the density contrast of Green shale and the reef core, and also between the contrast of the upper zones using the reef core as anticline builder.

The common assumption that the reef structures are indicated as zones of high gravity includes only one of the possibilities. We assume there are no standard pictures in gravity for finding reefs. The reason for this assumption is that the density contrast between Green shale and reef varies from zero to considerable plus-or-minus values.

The density of Green shale depends on the conditions in which the cementation of the Devonian took place. The compressibility of sedimentary materials is very high before cementation. The relation between depth of cementation and density is proved and varies from about 25 to 50 per cent of the original volume. After cementation, these sediments are practically incompressible. The volume reduction of the reef in relation to the depth is much smaller.

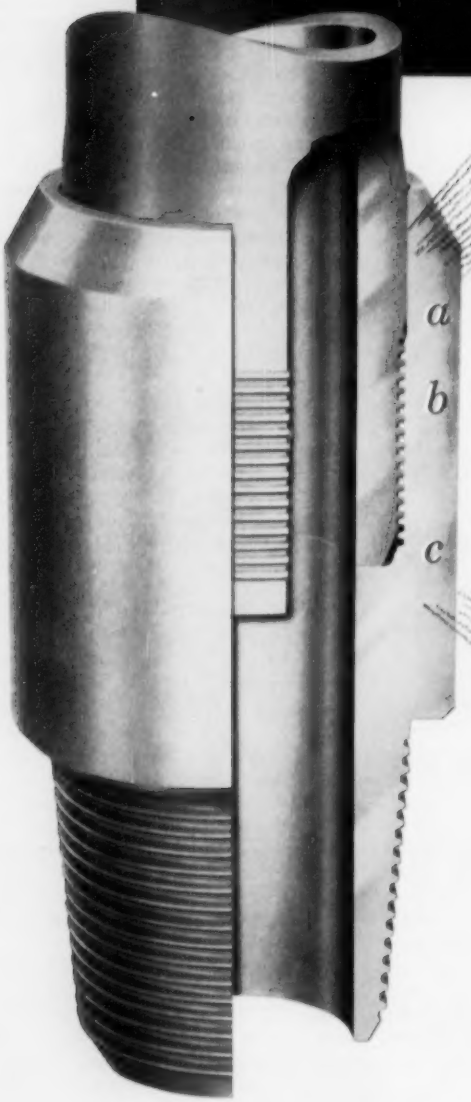
Both facts result in the vast possibilities in density contrast as mentioned above. For the upper zones, many possibilities also exist. If the upper Devonian sedimentation had long periods of erosion in later times, the remnants of D_2 and D_1 are smaller on top of the reef than without reef or reduced reef. And in spite of the doming above the reef, the gravitational effect will be a minimum.

Without long periods of erosion, such doming results in a gravitational maximum. The deduction arrived at is that such density conditions in the Devonian forces us to pay attention to both minima and maxima as possible structures when looking for reefs. In areas with drilled reef, gravity becomes an important method of eliminating reef zones from nonreef zones.

Foothills folds . . . The possibilities of prospecting for Cretaceous faults and anticlines of Turner Valley type are excellent. Unfortunately, density-contrast estimations were also not available from this field. But we could use relief outcrops estimations of the foothill zones north of Pincher Creek.

For the different layers, the values

The Reed Super Shrink-Grip
FIELD REPLACEABLE tool joint



protects your drilling string investment—against twist offs, against washouts, against leaks

BECAUSE: *a*. The Shrink-Grip "safety area" supports the drill pipe beyond the threaded section . . . and seals against leakage. *b*. Entire thread length is protected by seal at each end. *c*. Fixed landing shoulder assures proper make-up . . . and effects a seal.

extends your drilling string investment to drill "extra wells"

BECAUSE: The "field replaceable" feature of the Reed Super Shrink-Grip Tool Joint enables the operator to: 1. SAVE PIPE by reversing ends before excessive slip wear; 2. SAVE PIPE by replacing tool joint damaged by careless handling; 3. SAVE TOOL JOINT when pipe is bent or crushed; 4. SAVE PIPE when tool joints wear out after they have served their time in giving long trouble-free service.

REED ROLLER BIT COMPANY
HOUSTON 1, TEXAS

THE MARK OF QUALITY

NEW YORK LONDON BUENOS AIRES

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

5923-A

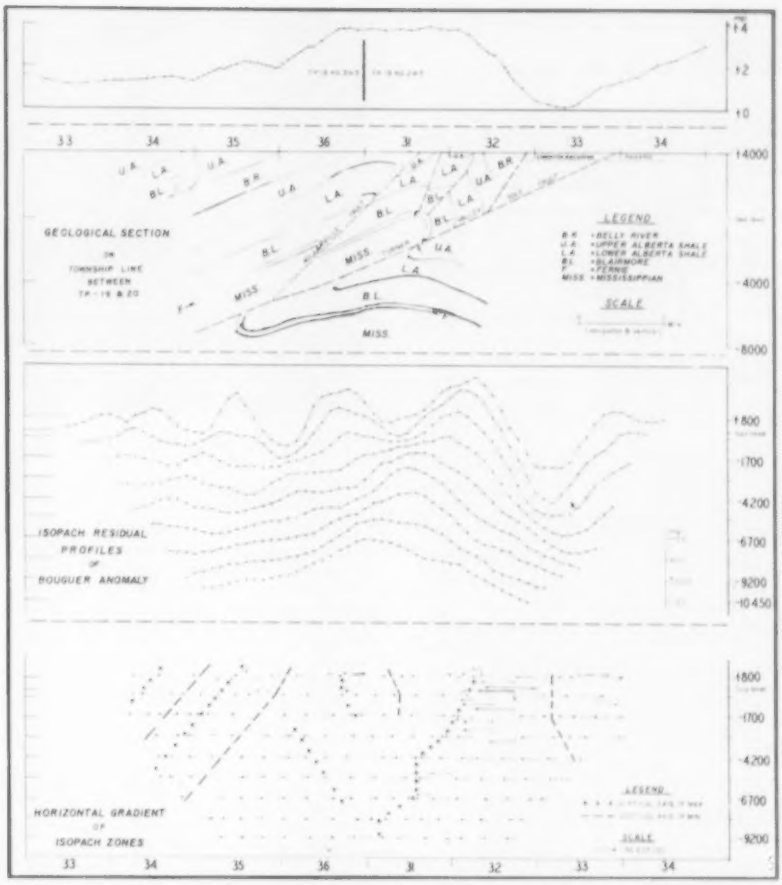


Fig. 2—Turner Valley is aparent even on the Bouguer profile. Notice that the gravity data indicate that the beds below the Turner Valley sole fault apear to be uplifted.

are average values of numerous samples. Supposing that the stratigraphic conditions in the foothills areas of Pincher Creek and Turner Valley are generally similar for all different sediments, these density estimations are of great value. There are remarkable density contrasts in the upper zones with Paskapoo 2.36, Edmonton 2.47, Bearpaw 2.35, Belly River 2.46, Upper Alberta shales 2.56, Lower Alberta shales 2.39, and Blairmore 2.56. Then density of Fernie and Mississippian are remarkable uniform with Fernie 2.56, Rundle 2.62, and Banff 2.56.

Both experiments also show how important it is to possess good density estimations from all layers. Without great cost, it should be possible for the drilling companies to supply gravity prospectors with such estimations of density of fresh samples from wells.

Erskine profile . . . This was the introductory profile (Fig. 1). It runs north and south along the west section line of 1, 12, 13-39-21w4, and 175 m. east of the west line of 35-38-21w4.

The stations are spaced 200 m. apart and have an accuracy of 0.01 milligals. Because of the flat country, no terrain corrections were made. The error in elevation and latitude correction is less than 0.01 milligals for each station.

The Bouguer profile indicates a regional increase in gravity of 1.5 milligals to the north. After eliminating the regional effect, a local maximum over the producing field is apparent. Remembering the density contrast between Green shale and reef of Leduc age, we can conclude that the Bouguer profile indicates the field but does not show its exact boundary.

Depth determinations have been computed for each 100 m. and are shown for a depth of 1,300 to 1,800 m. below sea level which is the depth of the Devonian. For these depths, we see that the variation of the residual gravity of the isopach layer compares favorably with the geological horizons.

It will be noted that where the reef formation is the thicker the gravity maximum is at its peak. When studying this map, it must be borne in mind that each 100-m. layer exerts its maximum influence in its own zone, but a remnant influence disturbs the neighbor zones. This fact must be kept in mind when interpreting the residual gravity curves. Because of the thinness of the 100-m. isopachs, the gravity curves are identical with a density variation curve and the curve indicates horizontal change in density.

As we previously stated, we do not have precise densities on the area. If they were obtained, more definite determination could be made. The experiment only demonstrates that reef prospecting with the gravity meter is possible.

Turner Valley Profile

It would be difficult and very troublesome to compute the total terrain correction for each station with the required accuracy of 0.01 milligals in a mountainous area. Still tiresome but easier is the solution with the requirement that the whole amount of this correction is not necessary but that its change going from one station to the next shall be correct within 0.01 milligals. The writer has worked up this method for his own use. This method guarantees the right terrain correction for the residual values. Furthermore, this method is still useful in regions such as Alberta where only provisional topographical maps exist.

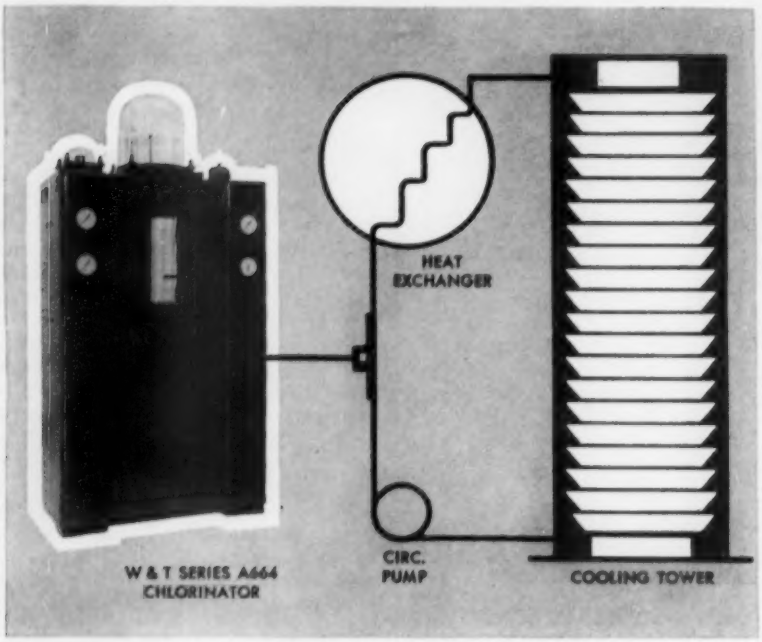
The location of the profile is 1 mile south of the town of Turner Valley, and it runs east and west on the township line. The general station spacing is 200 m.

The results of this profile are shown on the map of Turner Valley (Fig. 2). At the top of this map is the Bouguer profile. The cross-section below shows a geological East-West profile. The geology of Turner Valley is well known. Therefore, the cross-section is drawn only by using the given bore-hole information and the latest results of surface geology. Below the Turner Valley sole fault, the structural uplift of the Blairmore and Paleozoic is drawn as an interpreted result of the gravity.

THE AUTHOR

Dr. W. F. Stackler, P.Eng., is consulting geophysicist in Calgary. He received his doctor's diploma in Berlin in 1925 for a paper interpreting a gravity survey in Africa. From 1926 to 1945 he was with Seismos Co., Hannover, and in charge of a division. In 1945 he became a consultant, and in 1952 he moved to Calgary to establish his own practice as a consultant. He is a member of several professional societies. This article is a revised version of a paper that originally appeared in Oil in Canada entitled "Structural Prospecting With the Gravity Meter."

Slime Control...



...Chlorination of Cooling Water Circuits

Heat transfer losses caused by slime formation on condenser and heat exchanger water-side surfaces can be eliminated by chlorination of the cooling water. Water and air-borne organisms—the cause of slime formations—are effectively and economically controlled by Wallace and Tiernan chlorination systems.

The Wallace and Tiernan Series A-664 Chlorinator shown above is one of a complete line of W&T chlorination equipment, designed to give dependable chlorination at all feed ranges. It is used at large plants where cooling water chlorine requirements call for a durable high capacity unit.

We Invite Your Inquiries

Technical information on cooling water chlorination is available in our free booklet, RA-2061-C. Bulletins on chlorination of industrial process water and industrial waste treatment are also available. Write us for your copy.

WALLACE & TIERNAN INCORPORATED
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

CD-40

Turnbuckle Allows Easy Take-up

Several important advances in design by the makers of famous Laughlin Turnbuckles offer added safety and efficiency to turnbuckle users. For fast, easy take-ups with a wrench, Laughlin turnbuckle bodies have extra-heavy hex ends. An exclusive eye design that takes the ear of a shackle one size smaller, gives the Turnbuckle double usefulness Laughlin's exclusive eye design is stronger than conventional eyes because it conforms more closely to the lines of pull. This design also makes it easier to attach thimbles and other fittings. Redesigned Laughlin hooks have added heft at points of greatest stress. Exceptionally strong, the ¼" hook is actually stronger than most 5/16" hooks. Hot galvanized and forged from special forging steel with weldless construction, Laughlin Turnbuckles are offered in a complete range of end fittings in sizes from ¼" x 4" to 2¾" x 24". A reference chart in Laughlin's free catalog lets you select the proper size Turnbuckles for the wire ropes, chains or assemblies you use. For greater safety and strength, always specify world-famous Laughlin Turnbuckles.

For free catalog, write:

THOMAS LAUGHLIN DIVISION
American Hoist & Derrick Co.
St. Paul 1, Minnesota
makers of world-famous Crosby Clips

World's most complete line of fittings for wire rope and chain

Lower Alberta shales and Blairmore have also been found here in wells.

The isopach residual profiles are plotted separately from 800 ft. above sea level to 9,200 ft. below. Each isopach represents a layer of 1,250 ft. The station spacing of 200 m. is not close enough for an isopach higher than 800 ft.

In addition to the isopach residual profiles, we calculated the horizontal gradient for each layer. These gradients indicate in a well-known way the horizontal change of each layer. We have indicated maximum and minimum tendencies. The layer with maximum gradient shows the depth of the geological origin of a gravitational change. In the same way, it is possible to plot the isopach vertical gradients. However, since the horizontal gradients have a much greater significance, we omitted the vertical isopach gradients.

The results . . . The Bouguer gravity profile of the Turner Valley structure shows an influence of about 4 milligals. If we are satisfied with indicating structures of Turner Valley type without wishing to go into details about the shape and depth of such structures, it is not necessary to run the profile with such a short station spacing.

The surface geology is clearly indicated on the Bouguer profile. The large density contrast between upper and lower Alberta shales forms two secondary anticlines in the west of the whole profile. The gravitationally deepest part in the east occurs where we have the low density of the Bearpaw on the surface.

The isopach residual profiles and the isopach horizontal gradients of gravity are only worked up to a depth of 800 ft. above sea level. For the higher zones, we would need closer station spacing.

The given profiles only show the influence of the surface geology which decreases with depth. With additional short intermediate profiles, the gravity will be very helpful for geological surface surveys for tracing typical density changes on the surface.

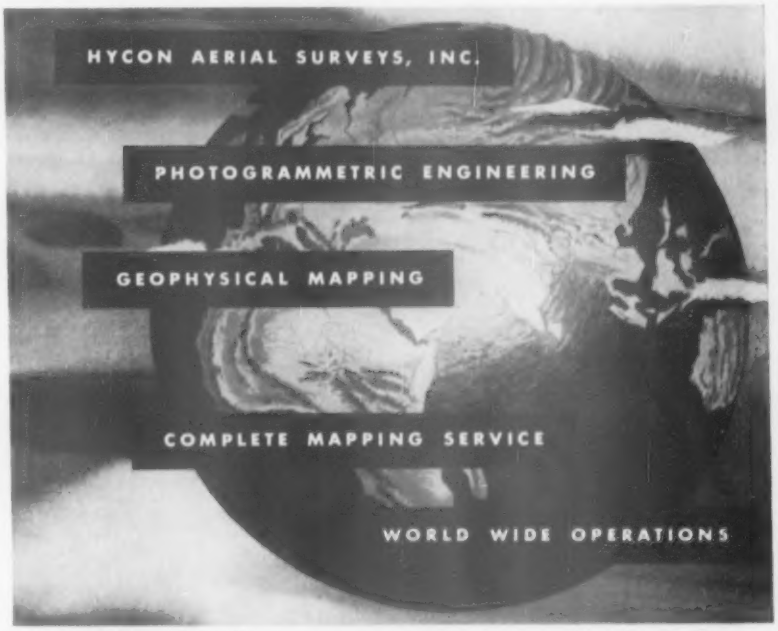
Most important for the gravitational picture is the density contrast between Blairmore and the lower Alberta shales in the deeper horizons. The main vertical maximum axis in the middle of the profile indicates this contrast. The zone of the maximum gradients is also at the right depth of the contact zone for both these layers. About 1½ miles west of the main axis, a secondary axis indicates the zones where the uplifted Blairmore has its largest density contrast against lower Alberta shales on the Millarville fault.

In the zones deeper than the Turner Valley sole fault, the main maximum axis is again significant. The part where the axis runs vertically is also indicated by maximum gradients. Calculations supported the supposition that we have to expect uplift of the Blairmore and the Paleozoic beds below the Turner Valley sole fault, as marked on the map (Fig. 2).

It is remarkable that between the Blairmore, Fernie and Mississippian, no gravitational effect is to be recognized. This is in accordance with the missing contrast between these layers.

If we presuppose a general knowledge of geology and density distribution, the Turner Valley experiment proves that gravity can detect structures of such type in the Foothills area so that test wells may be located.

Acknowledgment . . . I would like to take this opportunity to express my thanks to Jensen Surveys, Ltd., who conducted and provided the exceptionally accurate field work for this paper. I also wish to place on record my appreciation of assistance received from Texaco Exploration Co., Calgary. This company gave me the chance to obtain a detailed density profile in the Pincher Creek area from Tertiary to Precambrian using 267 different samples.



geophysical measurement and mapping

Hycon offers a complete service . . . magnetic, photogrammetric, radiation, electromagnetic.

• Varian airborne magnetometer • Varian high accuracy station magnetometer • Varian portable magnetometer • Hycon airborne scintillation counter • Airborne electromagnetic survey equipment • Aerial photography • Topographic mapping

MAIN OFFICE:
1020 S. Arroyo Parkway
Pasadena, California
SYcamore 9-4570,
PYramid 1-1028

WASHINGTON OFFICE:
910 17th St. N.W.,
Washington 7, D.C.
STerling 3-7070

DAYTON OFFICE:
Room 512
11 West Monument Ave.
Dayton 2, Ohio
HEmlock 2897

ILLUSTRATED BOOK

MAIL

Hycon

AERIAL SURVEYS, INC.

"Where accuracy counts"

HYCON AERIAL SURVEYS, INC.
1020 SOUTH ARROYO PARKWAY
PASADENA, CALIFORNIA

Please send brochure showing examples of your work

Name_____

Address_____

City_____ State_____

EXPLORATION HIGHLIGHTS

Hope for "Another Yates" Field Spurred by Ellenburger Wildcat

Test now at 3,250 ft.; projected depth is 9,500 ft.

by Carl Hoot

A NEW Ellenburger wildcat in an old Permian area on the southeastern end of the Midland Basin Platform is causing considerable speculation. Its structural position, and shallow oil shows have raised hopes that it might open another field similar to the big Yates.

The prospector is Tide Water Associated Oil Co. 1 White & Baker Ranch. Location is in Section 53, Block Z, TCRR Survey, just south of depleted wells in White & Baker field, and on a farmout deal from White Eagle Oil Co. and Panhandle Oil Co.

The well found Grayburg at 1,790 ft. which had no shows in the top, but a 50-ft. core from 1,945-95 ft. had good permeability, with porosity of 10-12 per cent, saturated with oil and highly fractured. At this writing drilling had progressed to 3,250 ft., and unofficial reports said further oil shows had been drilled. Projected depth of the test is 9,500 ft., or to the Ellenburger.

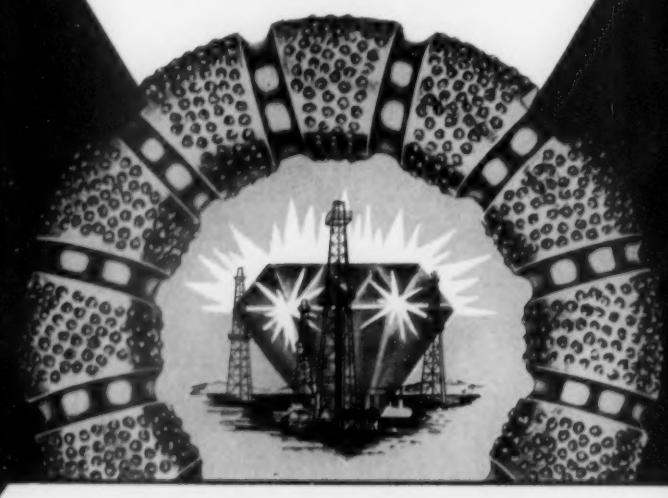
Field sources credited the well with being 200 ft. high on top of the Glorieta, correlated with a depleted Strawn discovery about 1¼ miles to the northeast. This has spiked interest in lower Permian and pre-Permian possibilities.

The hope of finding another field on the order of Yates has added fire to the search for oil in West Texas, much like the finding of another East Texas field has been to that area. Shallow production was opened at Yates in 1933, with pay around 1,000-1,800 ft., and cumulative production now approaches one-half billion barrels of oil for the Grayburg - San Andres zones. While the discovery there was a small well, records on the field show one Ohio Oil Co. well that made 8,524 bbl. of oil in 1 hour. Porosity in Yates field is also a prospector's dream, ranging from zero to nearly 100 per cent.

In addition to the Permian prospects at Tide Water's test, the general area will benefit from its pre-Permian geo-

Tide Water's Ellenburger test on the flank of shallow production has attracted attention by coring a good Yates section.

DIAMOND
CORING DRILLING



DOWDCO

TEXAS
Midland - Abilene

NEW MEXICO • OKLAHOMA
Hobbs - Farmington Oklahoma City - Ardmore

KANSAS • LOUISIANA
Arkansas City Shreveport - Lafayette

DIAMOND OIL WELL DRILLING COMPANY
3100 W. South Front Street
Midland, Texas • Phone 4-6648

DUAL CIP RECORDED BY RELIABLE BOURDON TUBE

Big New Reason Why HALLIBURTON'S Best In Drill Stem Testing

Old "Reliable" has a new use for reservoir evaluation. The Bourdon Tube gauge with its extreme accuracy and sensitivity, is the most precise recording device for Dual Closed In Pressure—an important new technique in Drill Stem Testing.

When the testing tool is opened into an air chamber of a predetermined volume, the expansion chamber permits release of the hydrostatic mud pressure. Then, by a limited amount of formation production, an Initial Closed In Pressure build-up curve is recorded. The build-up curve can be mathematically extrapolated to obtain static formation pressure.

Upon completion of the Initial CIP period, the auxiliary valve is opened to produce as on a *normal* Drill Stem Test. When the flow period is completed, a Final CIP is taken by closing in the formation with the packers still seated, permitting the formation to continue to produce—thereby recording a pressure build-up curve. The Testing Chart is given special reading. The reading and chart are then reproduced and mounted into a "Formation Testing Service Folder." Some important uses which have evolved from this data are:

A. *Static Formation Pressure*
B. *Effective Permeability of the Zone Tested*
C. *Skin Effect or Damage Factor*
D. *Production Indices on Flowing Wells*

Because it's the most precise recording device, Halliburton's Bourdon Tube gauge can be relied upon as a great aid in reservoir evaluation. Use it to more accurately evaluate your well. Phone your local or district office of the Halliburton Oil Well Cementing Company.

COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File

HALLIBURTON
TESTING SERVICE

250 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

JOHNSTON
Vertical
PUMPS
—good friends of the Engineer and Pocketbook

Here are 4 of a battery of 8 Johnston Pumps used on a cooling tower by a large Western Steel Corporation—

From the standpoint of dependability, economy, ease of installation and operation, Johnston Vertical Pumps set the pace for many different types of industrial, chemical and petroleum uses. High efficiency and superior design, backed by nearly a half century of know-how, are yours, when you specify Johnston Pumps. Write for colorful bulletin.

JOHNSTON
PUMP COMPANY
Founded in 1909
Bin "K," Pasadena 15, California

☐ Kindly send colorful, illustrated bulletin ☐ Have representative call

Name_____
Company_____
Address_____
City_____ State_____

OGJ—115

logical data. Helmerich & Payne, Cardinal Division's Pennsylvanian Strawn discovery at White & Baker field made a good well, from pay at 7,590 ft., but cumulative production was relatively small. Its producing record dates from 1945 to 1952.

However, interest in Ellenburger possibilities has picked up by the addition of a 500-bbl. Ellenburger well at Sheffield field, 10 miles southwest of the town of Iraan. Standard of Texas' discovery at Sheffield found pay at 9,800 ft.; and currently an extension well is in prospect.

With shallow and deep objectives to shoot at, Tide Water's test will be closely watched.

MID-CONTINENT

OKLAHOMA

Third Well for East Harness Field Indicated

The third producer for Grady County's fast-growing East Harness field is indicated at Sun Oil Co. 1 Billy, C NE NE 23-5n-7w.

A test in the Hoxbar sand at 9,983-10,037 ft. recovered 2,400 ft. of 36°-gravity oil.

Ohio Oil Co. 1 Briscoe-B, C SW SW 3-4n-5w, an extension well in the Southwest Bradley area, flowed 578 bbl. of oil per day on 14/64-in. choke on a 24-hour test. Perforations were at 13,560-14,000 ft.

Big Arbuckle Flow at Mr. Sam Field Well

Frankfort Oil Co. reported a flow of 1,000 bbl. of 37°-gravity oil in 24 hours on ½-in. choke at its 10 Baldwin in NE NE SE 5-1s-1e, Murray County.

This Arbuckle well is 1 mile west of the field discovery well of Mr. Sam field, opened earlier this year as an Arbuckle discovery. The flow at the 10 Baldwin was through open hole. Pro-

Index to area reports

Mid-Continent	270
Hugoton Embayment	274
Pacific Coast	274
Western Canada	277
Great Lakes	278
Ark.-La.-Tex.	278
Appalachian	280
Gulf Coast	280
Southwest Texas	283
Rocky Mountains	284
Successful Wildcats	288

A hole every 3 minutes

AIR DRILLING PATTERN HOLES WITH

HAWTHORNE

"Blue Demon"

INSERT ROCK BITS

All-formation rock bits in fractional sizes from 1⅞" through 6¾" for SHOT HOLE • SLIM HOLE • MINERALS EXPLORATION • STRATIGRAPHIC • CORE HOLE and WATER WELL DRILLING

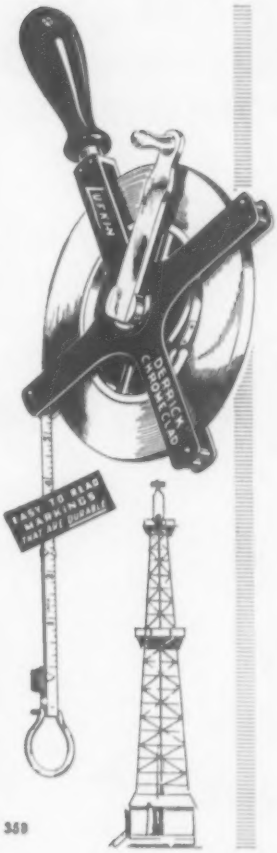
U. S. PATENTS 2,815,884 2,696,622 OTHERS PENDING

Actual drilling experience using 4¼" Hawthorne Insert Rock Bits on 20-foot pattern holes on the West Texas Plateau.

WRITE FOR ILLUSTRATED CATALOG

HERB J. HAWTHORNE INC.

P. O. Box 7366 • Houston 8, Texas



369

Narrow rugged line assures easier, more accurate measurements . . . *even in a high wind!*

LUFKIN "DERRICK"

CHROME CLAD STEEL TAPE

The Lufkin "Derrick" — designed by oil men — is the first choice for measuring casings in derricks and many other oil field jobs. Here's why:

- Extra sturdy line — only 1/8" wide — reduces wind resistance to a minimum.
- Non-glare Chrome-Clad satin finish line — will not crack, chip, peel or corrode.
- Permanent jet black markings — bonded to steel — graduations extend to edge of line.
- Line is extra heavy weight — fully subdivided — "instantaneous" readings.
- Oversize drum increases winding speed. Long handle gives extra leverage, locks line at any point.
- Substantial, 4-arm frame has tape roller in each arm. Tape removable from frame.
- Improved pattern finger rings. Patented reinforcing strip prevents kinking and first end breakage.
- Oversize block hook with serrated edges is securely riveted to lip of detachable, swinging ring.
- In 100 ft., 150 ft. and 200 ft. lengths marked feet, 10ths, and 100ths.

BUY LUFKIN

TAPES • RULES • PRECISION TOOLS FROM YOUR SUPPLY HOUSE

THE LUFKIN RULE COMPANY

Saginaw, Michigan • Barrie, Ontario

Load-Rated! for safety CROSBY BLOCKS

You can't go wrong with Load-Rated Crosby Blocks. The working capacity of each block is embossed on the side plates.

CROSBY PRODUCTS DIVISION
AMERICAN HOIST & DERRICK CO. St. Paul 1, Minnesota

COOPER T-420

TORQMATIC SELF-PROPELLED SERVICING and WORKOVER RIGS.

PEERLESS WELL SERVICING — GENERAL WELL SERVICING

GOLDSBORO, TEXAS
NOVEMBER 26, 1954

Fred E. Cooper, Inc.
Box 1890
Tulsa, Oklahoma

Attention: Mr. J. W. Allen, President

Dear Sirs

We have your Cooper Model T-420-42 double drum self-propelled unit in well service work.

We find it a good hoisting unit and as easy to place on well locations as our truck mounted units. Power, brakes, mast and operation fully meet the requirements of the deepest rod and tubing work in West Texas.

I do not know of any better recommendation than to say, just talk to any production man for whom we have done a job or any crew member. Our unit operator, Clayton Robinson, says he did not know such a good machine was built, and just send any man to me for a recommendation.

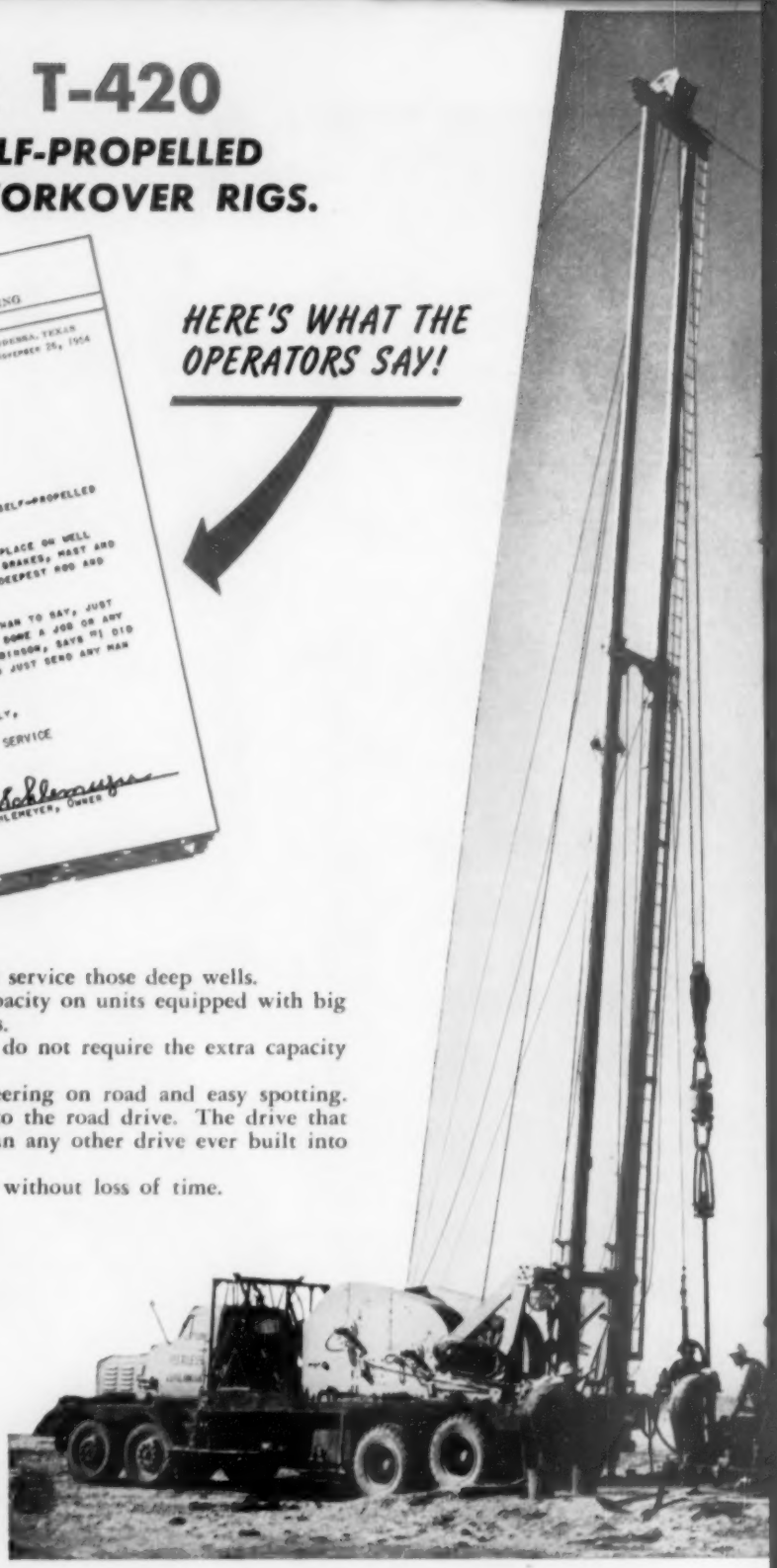
Yours very truly,

PEERLESS WELL SERVICE

By: W. L. Schlemeyer, Owner

WLS/m

HERE'S WHAT THE OPERATORS SAY!



A really rugged machine built especially to service those deep wells.
Dual front axles for extra load carrying capacity on units equipped with big capacity drums and heavy masts or derricks.
Single front axles are used on units which do not require the extra capacity of dual front axles.
Power steering for practically effortless steering on road and easy spotting.
Torqmatic drive to the winch drums and to the road drive. The drive that is safer and easier to operate and faster than any other drive ever built into a servicing rig.
Shifts gears instantly at full open throttle without loss of time.
Eliminates shocks to sub-surface equipment, winch and road drives.
There is no bucking or stalling engine in sand and mud or when spotting on location.
There is no engine clutch to operate or maintain.
Air friction clutches in the drums are self-adjusting.
Why not let a Cooper sales engineer explain in detail the many features and advantages of Cooper Torqmatic drive rigs.

It will pay you to get facts and prices on Cooper equipment before buying.

There is a size and type for any depth or field condition.

FRED E. Cooper, Inc.

P. O. BOX 1890 TULSA, OKLA.

Houston • Odessa • Los Angeles • Olney

Arrows point to Frankfort Oil Co.'s two Arbuckle wells on the north flank of the Arbuckle Uplift in southern Oklahoma, the 10 Baldwin and the 1 Sam, opener of Mr. Sam field.

duction is from 6,537-6,669 ft. The 10 Baldwin is one of four current operations in the field.

North Madill Report

Sinclair Oil & Gas Co. 3 Nunley in SE SW NW 15-5s-5e, flowed at the rate of 26 bbl. of oil per hour on a drill-stem test in the McLish sand at 6,695-6,715 ft. Another well in the field, the 1 Dillinger, SE SE SW 9-5s-5e, recovered 3,980 ft. of 35°-gravity oil on a test of the first Bromide sand at 6,564-6,614 ft.

Sinclair completed the 3 Griffin in NW NW NE 16-5s-5e for 102 bbl. of oil in 2 hours on 24/64-in. choke from perforations at 6,536-44 ft. Flow was natural.

Ten Discoveries Lead October's Exploration

October was one of the year's highlight months in Oklahoma exploration. Ten outstanding strikes led the month's successful list.

Southern Oklahoma . . . Stephens County received an important wildcat gas discovery at W. B. Cleary, Inc., 1 Ely, NW NW SE 9-1n-8w. The well flowed 11,000 M.c.f. of gas per day from 5,269-89 ft.

In 31-5s-6e L. W. Powell 6 Godfrey-Welch, SE SE NW, a reworked hole, was taken down to the Ordovician and Bromide sands at 4,752-70 ft. flowed 12 bbl. of oil per hour.

Carter Oil Co. got a good Bromide oil discovery at Wayne. The 1 Goodall, NW SW SW 11-5n-2w, flowed 15 bbl. of oil per hour from the Bromide sand at 8,060-8,100 ft.

Frankfort Oil Co. 1 Gardner, SW NE NW 34-6s-2e, opened a new reservoir on the so-called thirty-mile trend in southern Oklahoma. The well flowed 35 bbl. of oil per hour from open hole below 11,515 ft. in the Joins dolomite.

ALTEN PUMPING UNITS

Selling to beat the BAND

They are The Trend of TOMORROW

Last year Alten sales surged to an all time high because Alten has consistently offered more—and now—for 1955—Alten has designed and produced a line of pumping units with so many incredible improvements that it is years ahead of the field . . . SEE AND BE AMAZED . . . you'll realize that this is indeed something big. You'll see an ultra-new kind of a unit that will drive pumping costs down year after trouble-free year. Here is tomorrow's pumping unit today!

Write for this booklet

Get all the facts on new Alten units—send a postcard for this descriptive booklet—your copy is waiting.

AT YOUR LOCAL SUPPLY STORE

ALTEN
FOUNDRY & MACHINE WORKS INC.
LANCASTER, OHIO

The well was completed for 156 bbl. in 20 hours on small choke.

The highlight of the month was the completion of the first producer at Mr. Sam field in Murray County. The Frankfort 10 Baldwin, NE NE SE 5-1s-1e, flowed 1,000 bbl. of oil in 24 hours. Open hole was at 6,537-6,669 ft. The discovery well of the field also has Arbuckle production assured. This well was deepened and is nearing completion.

Central portion . . . A Bromide sand wildcat in 7-4n-2w flowed 144 bbl. of oil per day on 10/64-in. choke to give Superior Oil Co. a good discovery. The perforations were at 7,368-85 ft. at the 1 Glover.

West Short Junction had several more productive acres added in October as a result of the extension discovery at Powel Briscoe 1 Sudik, SE SW 4-10n-4w. The Hunton well made 1,000 bbl. of oil per day from perforations at 7,928-71 ft.

Reda Pump Co. found a Misener-Unconformity sand well in Oklahoma County at 1 Osborn, NW NW NE 2-11n-1w. The well flowed 10 bbl. of oil per hour on drill-stem test at 5,943-71 ft.

North portion . . . Kay County has a new Red Fork sand discovery area at Gulf Oil Corp. 1 Goodson, NW NE NW 24-28n-3e. The well made 14 bbl. of oil hourly from perforations at 3,179-90 ft.

Warren Petroleum Co.'s Beaver County wildcat, the 1 Bowles, SE SE NW 22-1n-20eCM, recovered 5,300 ft. of clean oil in 1 hour on a test of the Morrow sand at 7,255-81 ft. This is the Panhandle's important wildcat for the month.

HUGOTON EMBAYMENT

OKLAHOMA PANHANDLE

Harper Test Records High Gas Flow In Hoover

An-Son Petroleum Co. 1 Laverty, NW NW SE 26-26n-25w, Harper County wildcat, flowed at the rate of 11,000 M.c.f. of gas per day for 20 minutes from perforations in the Hoover sand at 4,170-90 ft. More production tests will be run in the lower Morrow sand, the other indicated pay at the discovery.

Morrow Oil Shows At Beaver Wildcat

Sunray Mid-Continent 1 Penner, SE SE NW 28-2n-20eCM, recovered free oil on a test in the upper Morrow sand at 6,960-84 ft. Recovery was 10 ft. of clean oil, 100 ft. muddy oil.

Texas County . . . Panhandle Eastern Pipe Line Co. 2-18 Enns, geological wildcat in C NE SW 18-3n-18eCM, is fracturing the Morrow sand. The well flowed 3,740 M.c.f. of gas per day, natural, at 6,230-72 ft. After mud acid treatment it made 4,420 M.c.f. per day.

New Beaver Locations

Two locations have been staked in Beaver County by Magnolia Petroleum Co. The 1 Sell will go down in SW SW NE 16-1n-20eCM, and the 1 Steward in C SE SE 22-1n-20eCM. The wildcats will go to the Morrow or 7,500 ft.

Warren Petroleum Co. is perforating the 1 Bowles, SE SE NW 22-10n-20eCM. Casing is set at 7,285 ft. The wildcat earlier indicated success on a drill-stem test at 7,255-81 ft. Recovery was 5,300 ft. of oil.

PACIFIC COAST

CALIFORNIA

Richfield Stakes Fillmore Site

Richfield Oil Corp. has announced a wildcat approximately ½ mile south-

REDA PUMPS

FIRST CHOICE for Secondary Recovery Water Flooding...

The lower the expense of producing source water from wells for water flooding operations, the greater the ultimate profit.

Reda Pumps for source water wells provide many ways for lowering these production costs.

Improved design and longer operating life *lower* the cost of labor per barrel, *lower* the cost of maintenance per barrel, *lower* the investment cost per barrel, *lower* the cost of fluid per barrel.

Also the ability of Reda pumps to produce greater volumes in limited casing sizes and from greater depths often reduces the number of source water wells required.

Reda engineers have long been associated with water flooding operations and are fully qualified to assist operators in discussing their source water requirements.

REDA
PUMP COMPANY
BARTLESVILLE, OKLA.

THIS IS THE LAST WORD IN WEIGHT-INDICATOR ACCURACY

Martin-Decker's new Sensater gives you friction-free weight indication

The E-80 Sensater is a new kind of *diaphragm* pressure transformer. It doesn't deflect, but moves with its backing plate. The slightest movement of your Ideal Wire Line Anchor creates a piston-like stroke, without a friction-causing piston-rod or packing.

With the new ultra-perceptive Sensater, your Martin-Decker Type "D" or "E" Weight Indicator becomes a more valuable tool than ever for such precision jobs as fishing, milling, cutting, and coring — a small investment to increase the life of diamond bits and other costly equipment making up a half-million-dollar drilling rig.

The big color-keyed indicator dial instantly tells you the accurate weight of the drill string and the net weight on bit in thousands of pounds. Included is a vernier, sensitive to minor weight changes.

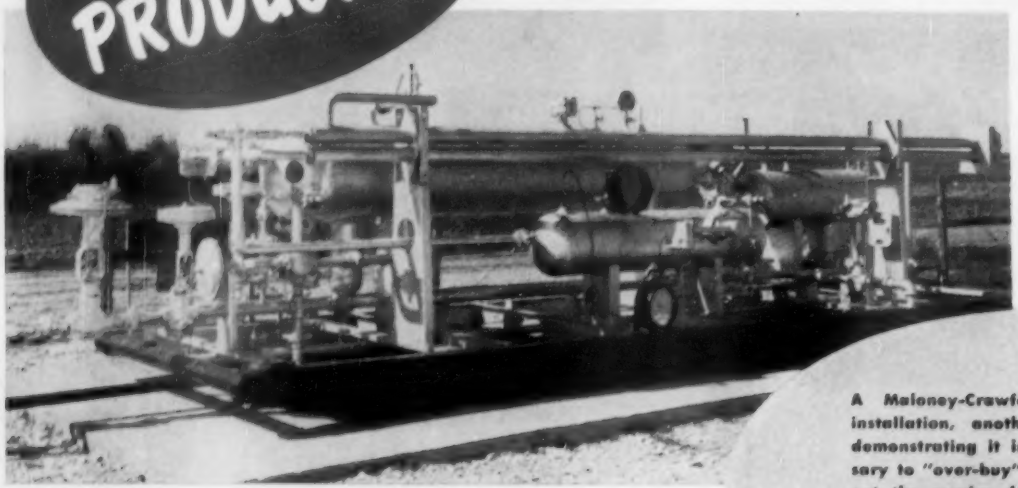
Martin-Decker's familiar red box is packed with valuable drilling information. The instrument panel includes a weight indicator, mud-pressure gauge, rotary torque gauge, draw-works speed selector, rotary-table tachometer, and a vapor-proof light. On the back is a 24-hour recorder with pens for weight, mud, and torque. Martin-Decker engineers will work out other instrument combinations for your special drilling requirements.

For further information ask for Bulletin P-10. Write: Martin-Decker, 3431 Cherry Ave., Long Beach 7, California, Dept. D-1.

DISTRIBUTORS: T. C. Cullen, Bakersfield, California; Reed Roller Bit Co., Houston, Texas; Reed Roller Bit Co. of Canada, Ltd., Calgary and Edmonton, Alberta. Martin-Decker Weight Indicators and Ideal Wire Line Anchors are also sold through The National Supply Co., The National Supply Co. Export Division and other recognized supply houses.

MARTIN-DECKER CORP.
HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA

OPTIMUM PRODUCTION . . . FOR HIGH PRESSURE GAS-DISTILLATE WELLS



A Maloney-Crawford Dricold installation, another instance demonstrating it is not necessary to "over-buy" capacity to get the service desired when using M-C separators and treaters.

With a Maloney-Crawford DRICOLD Packaged Cold Separator

Users of Maloney-Crawford's "Dricold" Cold Separator report distillate recovery from high pressure gas wells as being increased as much as 30 percent over conventional two stage separators.

Very low water dew points are obtained through the unit, even when the available pressure drop is so low as to be considered marginal for other cold separators.

The finest available control and accessory equipment is standard on the M-C Dricold unit—to reduce maintenance costs and down-time.

Dricold units are available in capacity ranges up to 15 million cubic feet a day.

Maloney-Crawford Sales and Stock Points

A M-C representative is available at any one of the following locations to discuss how Dricold can benefit you: Corpus Christi, Cushing, Dallas, Duncan, Fort Worth, Hobbs, Healdton, Houston, Lafayette, Midland, New Orleans, Odessa, Oklahoma City, Pampa, San Angelo, Tulsa, Wichita Falls, Calgary, Edmonton, Regina, Swift Current or Virden.

MALONEY-CRAWFORD TANK AND MANUFACTURING CO.

FACTORY AND GENERAL OFFICE: 38 North Peoria—Box 659—Tulsa, Oklahoma.
EXPORT REPRESENTATIVE: Baird Lines—1017 Grand Central Terminal Bldg., New York 17, N.Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford Tank & Service Company, Ltd.—Edmonton.
TEXAS PANHANDLE REPRESENTATIVE: Atlas Tank Company—Pampa, Texas.

MALONEY-CRAWFORD TANK & MFG. CO.

west of its recently abandoned 16,015 ft. 1 Homburg near Fillmore in Ventura County. Richfield's new wildcat, 1 Hunter, is located in SE NE 36-4n-20w. This is about 2 miles east of Standard Oil Co. of California's deep Fillmore field.

Basement Test Nears Bottom

Terminal Oil Co. 3-1 Di Giorgia, a basement test 1 mile east of production in Mountain View field of Kern County, was cementing 7-in. casing at 5,685 ft. This test, a joint operation between Terminal and J. D. Wrather, was slated to drill to basement, expected below 6,000 ft.

Gas Field Extenson Test

Casing was being run in 1 Honolulu-Humble-Carter, Honolulu Oil Corp.'s extension test to its South Princeton gas field in Colusa County. This well, located on a SW SW 7-17n-1w site, is 1 mile northwest of the discovery well brought in last July. The field discovery, 1 Honolulu-Humble-Tuttle, was completed for 2,030 M.c.f. gas at the perforated interval 2,380-95 ft. The new test was bottomed at 3,400 ft.

Possible Gas Field Discovery

Western Gulf Oil Co. may have scored a new gas discovery at its 1 Arbuckle Unit A, 3 miles southeast of the town of Arbuckle in Colusa County. A formation test of the interval 5,525-50 ft. yielded gas at 1,700 M.c.f. a day rate through a ½-in. choke. Western will test other showings before completing the well which has bottomed at 7,500 ft.

Site of this rank wildcat, SE NW 14-13n-2w, is more than 12 miles from the nearest production.

Union Wildcat Encouraging

Union Oil Co. has had encouraging oil and gas shows at several intervals on its wildcat ½ mile south of the Guadalupe field in Santa Barbara County. Casing has been run in the well, 37 Union Sugar, and a pumping test was slated to get under way.

WESTERN CANADA

SASKATCHEWAN

Production Tests Being Run at Halbrite Strike

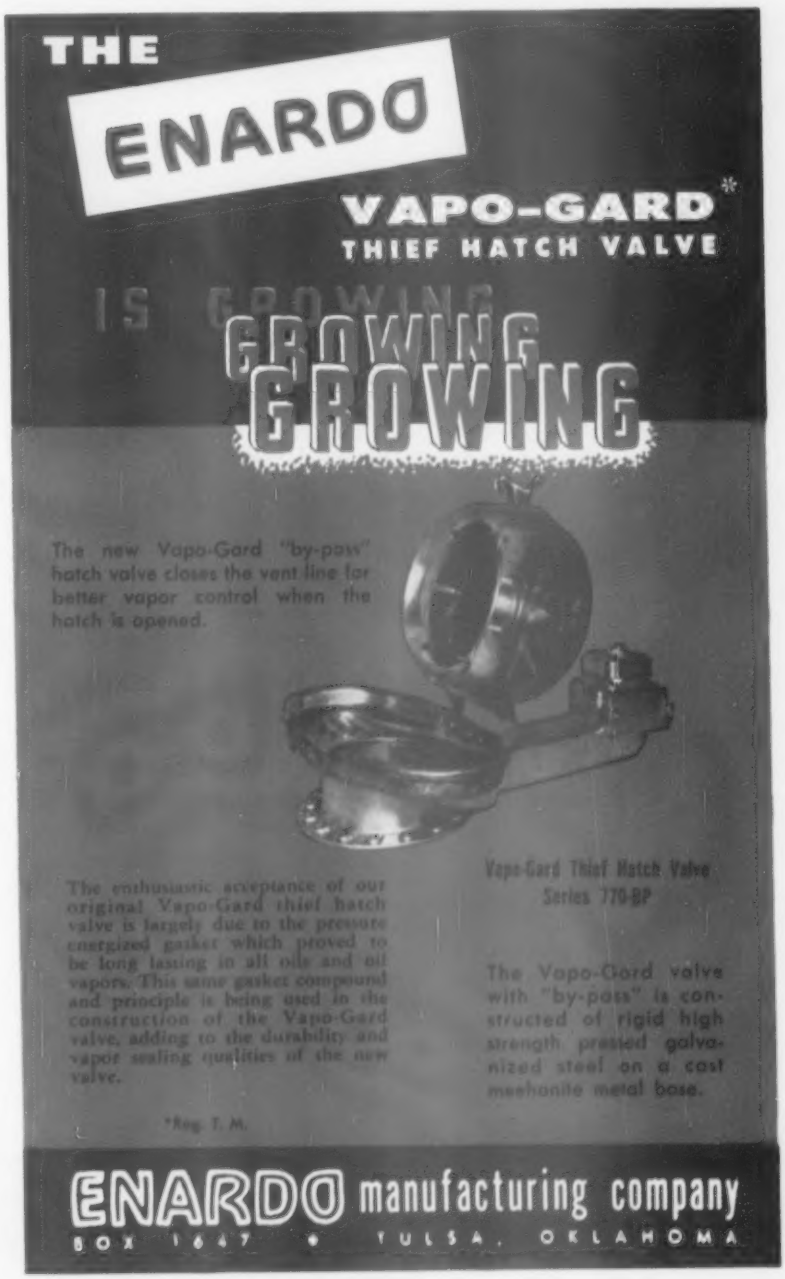
Shell Oil Co. is running tests at its newest indicated oil strike in southeastern Saskatchewan. The Shell A15-18 West Halbrite, LSD 15, 18-6-12w2, is 16 miles southeast of Weyburn and 4½ miles southeast of Socony-Central-Del Rio 28-2 Ralph, oil discovery well.

The Shell strike found its oil in the Charles sector of the Mississippian lime and the intervals 4,599-4,616 and 4,632-60 ft. have been perforated and acidized. During initial tests, about 40-50 bbl. of oil have been produced along with the same amount of water. That test was 24 hours long on pump.

New Enlarged-Scale Map Of Canadian Wells Available

"Oil and Gas Wells in Western Canada," a new enlarged-scale book of maps, is now available from the Nickle Map Service, Ltd., Blow Building, Calgary, Alberta. This book of maps of Canadian oil and gas fields is published quarterly. It gives a convenient picture in map form of drilling activity in the western provinces. The map indexing system fits that used by the federal and provincial governments in Canada, and these maps can be readily related to geological reports and maps issued by Crown agencies.

Scale is 6 miles to 1 in., allowing a reasonable area coverage for each map sheet. The maps are revised daily.


THE
ENARDO
VAPO-GARD*
THIEF HATCH VALVE
IS GROWING
GROWING
GROWING
The new Vapo-Gard "by-pass" hatch valve closes the vent line for better vapor control when the hatch is opened.
Vapo-Gard Thief Hatch Valve Series 770-BP
The enthusiastic acceptance of our original Vapo-Gard thief hatch valve is largely due to the pressure energized gasket which proved to be long lasting in all oils and oil vapors. This same gasket compound and principle is being used in the construction of the Vapo-Gard valve, adding to the durability and vapor sealing qualities of the new valve.
The Vapo-Gard valve with "by-pass" is constructed of rigid high strength pressed galvanized steel on a cast meehanite metal base.
*Reg. T. M.
ENARDO manufacturing company
BOX 1647 • TULSA, OKLAHOMA

ALBERTA

Light Oil Discovery Made Southeast of Lethbridge

Mobil Oil of Canada, Ltd., made a light gravity crude discovery in the southern portion of the province, 7 miles southeast of Lethbridge and 2 miles northwest of Wilson railpoint.

This new find, Mobil-CPR 32-12 Wilson, LSD 12, 32-7-20w4, was recorded earlier but the operating company did not release any details of the strike until recently. The discovery of 33.4°-gravity oil was made in the Madison, topped at 3,945 ft. (900 ft. below sea level). An indicated 17 ft. of pay zone was found.

Crew which drilled the wildcat to 4,341 ft., total depth, has since run production casing, perforated, and production tests are currently being run. During the first 16 hours crude oil flowed at the rate of 88 bbl. per day. The next 24 hours indicated a flow rate of 97 bbl. per day, no water. Since those tests, two others, both 24 hours in duration, have been announced, giving the well an even greater flow rate, or 153 and 156 bbl. per day. All the tests were on 20/64-in. choke, and of the interval 3,952-60 ft.

a practical employee relations program

featuring

WHITMOR

America's most distinctive

FIELD HOMES

A single field home or entire housing program can be constructed by Whitmor Homebuilders . . . anywhere in the nation. Site fabricated, quality housing is an asset for your company and the pride of any field employee. Investigate Whitmor's famous "lease-rental" program for any housing development. Whitmor has over 35 years of construction experience. Present projects are being constructed in Newcastle, Wyoming; Baker, Montana; Satana, Kansas; Winters, Texas; and Lindsay, Oklahoma.

WHITMOR HOMEBUILDERS INC.

INDUSTRIAL HOUSING | THE FINEST IN THE FIELD

5525 EAST 15TH STREET • BOX 5037—TULSA, OKLA. • PHONE MAdison 6-1137

GREAT LAKES

MICHIGAN

Across Michigan to the northwest, on the western rim of the basin, the Muskegon Development Co. completed its 1 Westberg et al., SW NE NE 30-13n-16w, Otto Township wildcat, Oceana County, as a new Traverse horizon oil discovery well good for 14 bbl. of oil a day on the pump after a 500-gal. acid treatment. Top of Traverse lime was logged at 1,857 ft. Hole was bottomed out at 1,860 ft., total depth. Well pumped about 2 bbl. of oil a day natural.

- New lower Detroit River oil pay, first for southwestern Michigan to date, was still under test at the Louis Zellman 4 B. Zellman, NW SE NE 25-4n-13w, Salem Township, Allegan County. While testing was as yet not complete, this first lower Detroit River producer in the district appeared to be producing an average of 25 bbl. of oil and 100 bbl. of water daily on initial pump tests after a 2,000-gal. acidization at 2,107 ft., total depth. Pays showed at 2,082-86 and 2,098-2,106 ft.
- One offset test had been spudded early in November by Ford Oil Co. at the east 20-acre offset to the 4 B. Zellman. The Ford offset was located in the NW SW NW 30-4n-12w, Dorr Township, Allegan County.
- The Moco logged a Stray sand gas, gaged at 2,700,000 cu. ft. of gas a day at the 1 Towle, NE SE NE 17-11n-8w, Pine Township, Montcalm County. New well, best in the area for Stray sand gas, is located about a mile southwest of an earlier discovery drilled by same operator in the SW NE SE 9-11n-8w, which was rated good for 2,200,000 cu. ft. of gas a day when completed. However, new producer, originally announced as a Dundee-Reed City zone wildcat oil test, is structurally higher on upper markers by 5 to 17 ft. over correlating control points and all of Stray sand pay may not have been drilled. The Moco will skid rig, core Stray sand at next test which will be carried to the originally announced oil pay objectives. Stray sand at 1 Towle was logged at 1,221 ft.

ARK-LA-TEX

ARKANSAS

Four New Pay Strikes Recorded In October

October exploration in Arkansas came up with four new pays, three in southern oil fields and one new gas pay in northern areas.

Carter Oil Co. 1 Harvey, a field well at Fouke, flowed 93 bbl. of oil per day from the First Tokio sand to open a new pay for the field.

The first Mooringsport well in new McKinney Bayou field, Miller County, is George Belchie, Jr., and Mercury Drilling Corp. and associates 1 Purifoy, 23-16s-26w. The well pumped at the rate of 196 bbl. per day from perforations at 4,059-69 ft. The field's other pays are the Tuscaloosa and Glen Rose or Paluxy sands.

The first Travis Peak producer for Union County's Pigeon Hill field is Advance Exploration Co. 1 Southern Co., C NE NW SW 28-16s-12w. The well pumped 31 bbl. of 18°-gravity oil per day from perforations at 2,923-25 ft.

Murphy-Stephens and associates opened a new pay in Moreland gas field, Pope County. The 1 McGuire, C SW NE 15-8n-19w, rated an open flow of 2,930 M.c.f. per day from a higher Atoka sand that produces in the discovery well.

NORTH LOUISIANA

October Was District's Most Successful Month

Four new oil and gas discoveries in North Louisiana made October the best exploratory month of the year for the region.

Trans-Tex Drilling Co. opened Guthrie Lake field in Catahoula Parish, 1½ miles northeast of Harrisonburg. The 1 Stutson, 7-9n-7e, flowed 62 bbl. of oil per day on 5/64-in. choke from Wilcox perforations at 4,200-05 ft. Current field status is: two dry holes, one well set for completion try, and three locations staked.

● J. D. Caruthers et al. opened West Lisbon field, 2 miles west of Lisbon in Claiborne Parish. The 1 W. E. and A. G. Killgore, 20-21n-5w, flowed 3,650 M.c.f. of gas per day and 389 bbl. of condensate on 20/64-in. choke from perforations in the Haynesville at 10,432-48 ft.

Trans-Tex 1 Drake, C SW SW SE 32-19n-7w, opened Gibsland field in Claiborne Parish. The well flowed 15,000 M.c.f. of gas per day and 2.8 bbl. of condensate per million from Tokio perforations at 2,820-40 ft. No further activity has been reported to date in the new area.

● Jett Drilling Co., Inc. C-2 Madison Oil & Development Co., NW SE 16-5n-8e, 5 miles southeast of Monterey, Concordia Parish, opened Quinn Bayou Wilcox field. The well flowed at the rate of 165 bbl. per day from Perforations at 4,812-13 ft. One new well has been staked in the new area.

● Jack W. Grigsby 1 Johns-John-

HENRY H. PARIS DISTRIBUTOR, Inc.

OIL WELL, REFINERY AND INDUSTRIAL SUPPLIES

1125 ROTHWELL ST. • P. O. BOX 932 • HOUSTON, TEXAS

Agent and Distributor for the Following Nationally Known Manufacturers:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Surface Equipment.

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC Valves, Bronze, Iron, Cast, and Forged Steel for all purposes.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

STEEL FORGINGS, INC.
Shreveport, La.
Weld Saddles.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

LOS ANGELES BOILER WORKS
Los Angeles, California
Welding Caps—Dished & Flanged Heads.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels. Prevents spillage—easily loaded.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

son, 17-14n-16w, is the first Glen Rose well in Bethany-Longstreet field, Caddo Parish. The well flowed 30,000 M.c.f. of gas per day and 3 bbl. of condensate per million. Perforations were at 4,120-25 ft.

● Lamar field in Franklin Parish was extended more than 2 miles southwest at Carpenter Oil Co. of Louisiana, Inc. 1 Ward, SW NW 7-15n-9e. The Tuscaloosa well flowed 10,000 M.c.f. of gas per day, open flow, plus 20 bbl. of condensate per million from perforations at 5,033-36 ft.

● Madison Parish's Indian Lake field was extended more than 1 mile northwest at Atlantic Refining Co. 1 Montgomery, 14-15n-9e. The well flowed 500 M.c.f. of gas per day and 2 bbl. of condensate on ¾-in. choke. Tuscaloosa perforations were at 5,382-98 ft.

APPALACHIAN

OHIO

E. C. McManaways' 2 John Demyon, Lot 2, Eaton Township, Lorain County, drilled near an old abandoned well, looks like it will make a big producer. Clinton sand, found at 2,630-39 ft., filled up 200 ft. natural and gaged an estimated 1,000,000 cu. ft. gas and 700 bbl. oil after fracturing.

● Hall, Bowman et al. 1 C. Charles Sweazy, Section 11, Green Township, Hocking County, proves up another lease in the Greendale area. Sand at 3,009-30 ft. gaged 650,000 cu. ft. with a showing of oil natural and 1,100,000 cu. ft. after treatment. The oil volume will not be gaged until well is on line.

● The first well to be fractured in the old Danville pool made 126 bbl. in a 24-hour test. The completion, by Trans-Allegheny Oil on 1 L. M. Mills, Section 1, logged the Clinton at 2,754-94 ft.

WEST VIRGINIA

In Roaring Creek district, Randolph County, West Virginia, Seneca Gas & Oil Co. 1 Simon K. Scott, wildcat elevation 2,131 ft., was dry through the Fifth sand at a total depth of 2,366 ft. The Big lime was at 1,304 ft.

● Grant district, Jackson County, D. D. Foster 1 Everett Burdette, elevation 834 ft., recorded the Oriskany sand at 4,430-56 ft., with a very light show of gas at 4,435 ft., and shut down at 4,462 ft.

● Licking district, Tucker County, Hope Natural Gas Co. 9966 T. A. Loughry is drilling at 3,015 ft.

● In St. George district, Columbian Carbon Co. 1215 U.S.A., is at 4,854 ft., and 1219 U.S.A., at 2,837 ft.

PENNSYLVANIA

Banks Township, Indiana County, Southwest Pennsylvania, Columbia Carbon Co. 1831 Farmers & Miners Trust Co. is drilling at 340 ft.

GULF COAST

SOUTH LOUISIANA

Lafayette Discovery Opens Rich Condensate Reserve

A rich gas-condensate reserve appears to have been opened in the Ridge Townsite area, southwestern Lafayette Parish.

Its discovery well, drilled by Sunray Mid-Continent Oil Co. with Buffalo Oil Corp. and Warren Petroleum Corp. as joint operators, flowed 533 bbl. of condensate with 2,600,000 cu. ft. of gas in a 24-hour test through 5/32-in. choke.

Flow was under pressure of 7,000 psi. Pressure, with the well shut in,

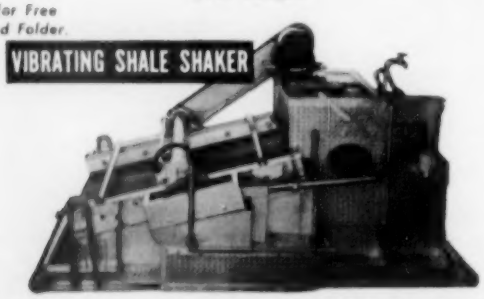
You Get a Top Job with a THOMPSON!

That's what drillers and profit-wise operators everywhere are saying. They're using the Improved THOMPSON Vibrating Shale Separator with Sample Machine. It's an important part of their standard equipment.

Wells are fed a steady flow of *clean mud* with a THOMPSON because its vibrating action effectively removes abrasives and shale from drilling muds. The Sample Machine supplies foot-by-foot specimens of formation cuttings. It's standard on all THOMPSON Separators unless otherwise specified.

Every THOMPSON Separator is field-proven. Performance, as specified, is guaranteed, economy is a reality, and its cost fits your budget.

Write for Free Illustrated Folder



Manufacturers also of the famous THOMPSON Self-Motivating Rotating Shale Separator and Sample Machine.

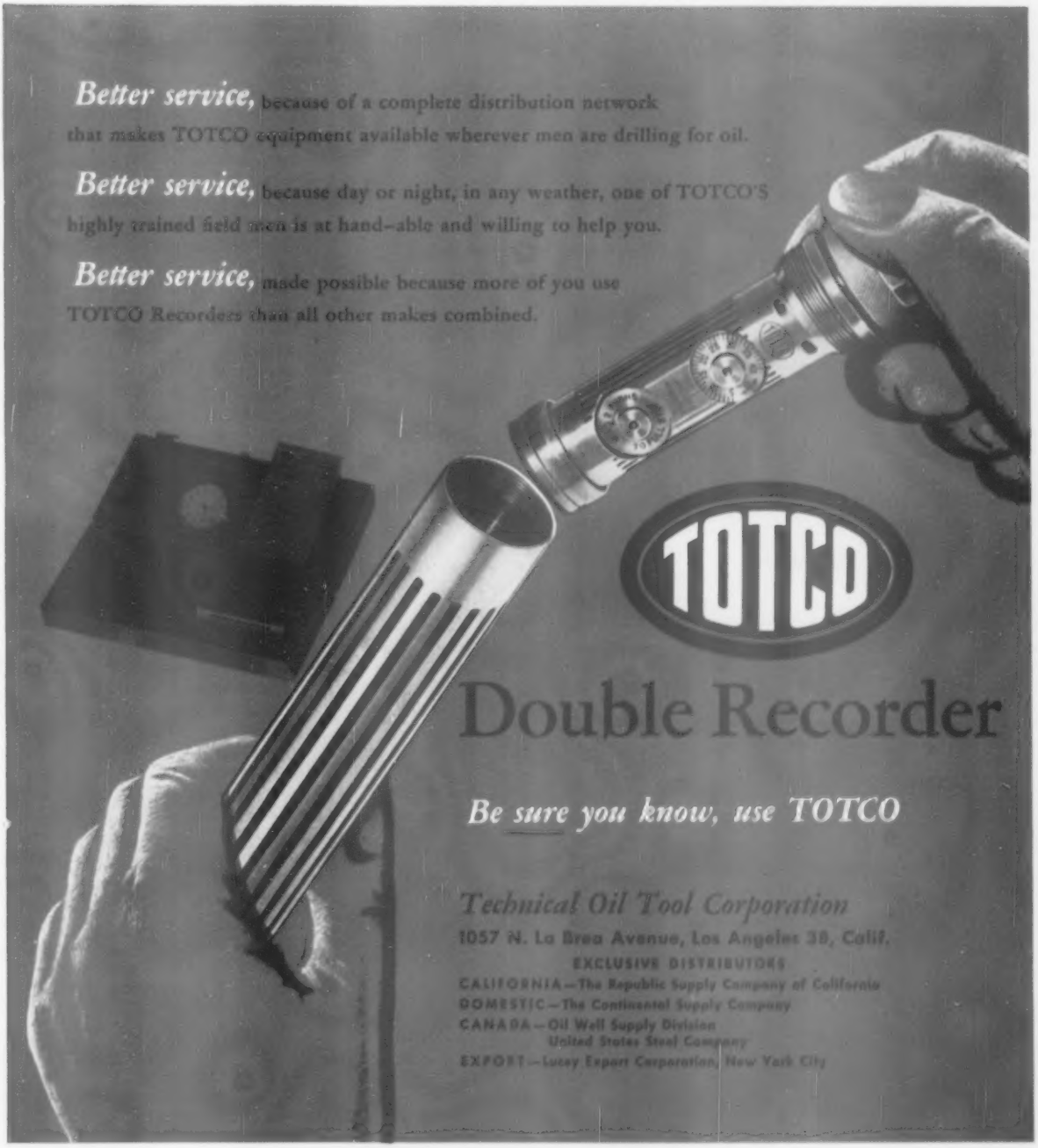
THOMPSON TOOL CO.

IOWA PARK, TEXAS

SOLD THROUGH SUPPLY STORES EVERYWHERE

From Tulsa to Teheran

TOTCO means Better Service


Better service, because of a complete distribution network that makes TOTCO equipment available wherever men are drilling for oil.
Better service, because day or night, in any weather, one of TOTCO'S highly trained field men is at hand–able and willing to help you.
Better service, made possible because more of you use TOTCO Recorders than all other makes combined.
TOTCO
Double Recorder
Be sure you know, use TOTCO
Technical Oil Tool Corporation
1057 N. La Brea Avenue, Los Angeles 38, Calif.
EXCLUSIVE DISTRIBUTORS
CALIFORNIA—The Republic Supply Company of California
DOMESTIC—The Continental Supply Company
CANADA—Oil Well Supply Division
United States Steel Company
EXPORT—Lucey Export Corporation, New York City

Beat Sucker Rod Corrosion with Corexit

Sucker rods, old or new, get positive protection against corrosion when treated with COREXIT.

Inside the casing—inside the tubing and on the sucker rod, COREXIT builds up a lasting film, loosens scale, and prevents further corrosion.

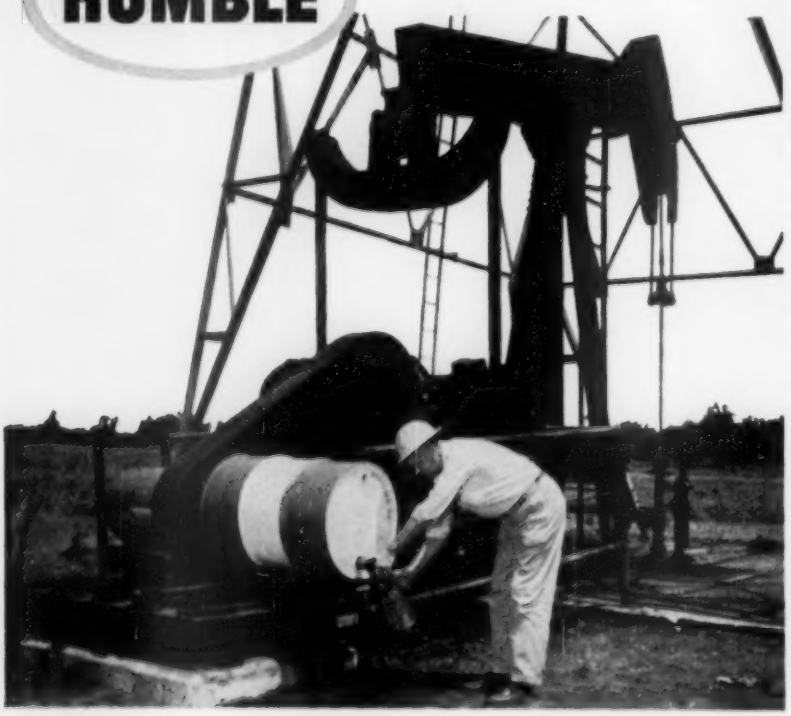
COREXIT also checks hydrogen embrittlement, a frequent cause of sucker rod breakage.

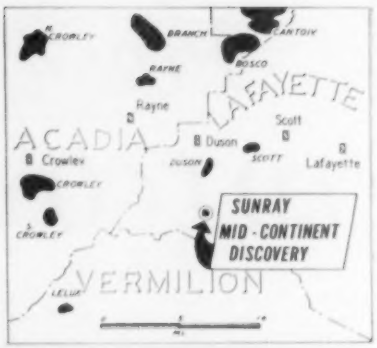
Get all the facts on COREXIT and its money-saving advantages on your job.

For complete details on COREXIT, write

SALES TECHNICAL SERVICE DIVISION
HUMBLE OIL & REFINING CO.
P. O. BOX 2180 • HOUSTON, TEXAS

HUMBLE HUMBLE OIL & REFINING CO.





Location (indicated by arrow) of Sunray Mid-Continent Oil Co.'s new gas-condensate discovery in southwestern Lafayette Parish.

was 7,974 ft. Gravity of the condensate was 49.7°.

Completion is in the Cibicides sand, of basal Frio age. Perforated interval is 12,158-75 ft. This is the deepest of six potentially productive zones logged in the well. The others have not been tested.

The well, 1 Trahan, is on a block of approximately 3,000 acres, owned jointly by the three companies with Sunray Mid-Continent as the operator. Its location, in 20-10s-3e, is about 2 miles south of deep gas-condensate production being developed by Sunray Mid-Continent and Buffalo in the Duson area.

New Grand Coulee Field Spreads Two Directions

A two-way extension of productive area in the new Grand Coulee field 4 miles northwest of Maxie, in Acadia Parish, is in the making with testing under way at outpost locations both north and west of the field.

A mile north of production, Vincent & Welsh and George McGhee, discoverers of the field, opened last May, tested 1,447,000 cu. ft. of gas and 85 bbl. of condensate per day in their 1 Hensgens, perforated at 10,422-26 ft.

The test was made through drill pipe, using ¼-in. and 11/64-in. chokes with 4,500 ft. of water cushion. Flowing pressure gaged 3,300 psi. Hole was drilled to 11,113 ft.

A mile west of production, Lago Petroleum Co. has an indicated oil producer at its 1 Houssiere, being completed in sand perforated at 10,190-93 ft. While cleaning, the well flowed an ungaged volume of oil with some water. It was drilled to 10,260 ft.

The three wells already completed in the field produce oil from the Homeseekers sand at depths of 10,135 to 10,200 ft.

STOCKS • BONDS
COMMODITIES

★ RESEARCH ORGANIZATION: Specialized and general information and statistics by telephone or mail.

★ BONDS AND UNLISTED SECURITIES: Extensive facilities for reaching large and small markets.

★ COMMODITIES: Long experience in handling grain, cotton and other commodities.

★ SUPERVISED INVESTMENTS: Portfolio analysis and continuing supervision.

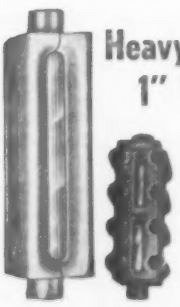
★ BLOCKS OF SECURITIES: We specialize in handling large blocks of securities.

HARRIS, UPHAM & CO.

Members N. Y. Stock Exchange
New York Curb Exchange
Chicago Board of Trade

PHILTOWER BUILDING
TULSA, OKLAHOMA

35 Offices Coast to Coast



Heavy Glass, 1" Thick

Gauge glass in Inferno gauges is 1" thick, specially tempered and heat treated. This glass is held in the gauge by equal pressure on both sides around the entire edge of the glass. The body is available in 3 different metals, and is machined from solid bar stock. Write for Bulletin 23-A.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

TEXAS GULF COAST

Deeper Oil Pay Opened In New Liberty County Field

Jack Frazier's second well for the new Southwest Hardin field, in Liberty County, is opening a deeper oil pay than that in which his discovery well was completed last September.

The discovery well, 1 Wirt Davis, is productive from two Yegua zones, one perforated at 7,986-90 ft., and the other at 8,686-90 ft. The second well, 1 W. J. Barrett estate, 1,100 ft. north of the discovery producer, is perforated at 8,835-39 ft. Its completion flow, through ⅛-in. choke, was at the rate of 217.21 bbl. of 36.4°-gravity oil per day. It had flowing pressure of 1,600 psi., and gas-oil ratio of 833 cu. ft. per barrel.

Nueces County Wildcat Uncovers Two Oil Zones

Wymore Oil Co. and D. D. Feldman are making a dual-zone oil producer in their 1 Rockett, a wildcat 3 miles north of Banquete, in Nueces County. The new field it opens is more than 1½ miles north of Agua Dulce field, and about 2 miles west of the south end of North Agua Dulce field.

The well's lower productive zone is perforated at 7,151-61 ft. A preliminary drill-stem test, open 20 minutes through ¼-in. choke, flowed pipeline oil with maximum surface pressure of 186 psi. Bottom-hole flowing pressure was 875 psi., initial, and 1,375 psi., final. Shut-in bottom-hole pressure was 3,475 psi. Recovery was 2,238 ft. of oil.

A shallower sand, at 5,920 ft., is being opened for the dual completion. In an open-hole drill-stem test of this sand, taking in interval at 5,912½-20½ ft., 380 ft. of 44°-gravity oil was recovered. Testing tool was open 30 minutes through ¼-in. chokes.

SOUTHWEST TEXAS

Two-Zone Producer Opens New Hidalgo County Field

Shell Oil Co. has a new gas-condensate discovery in southern Hidalgo County, in the Rio Grande Valley. It is in the Oblate area, 12 miles northwest of McAllen, where its 1 Works, a wildcat, has been completed with production from two zones, the deeper perforated at 7,562-82 ft., and the other at 7,390-7,408 ft. The well was drilled to 9,758 ft., was plugged back to 8,400 ft. with casing cemented at 8,578 ft.

Completion flow from the lower zone

B and W
LATCH-ON
CENTRALIZER
B and W
MULTI-FLEX
SCRATCHER
REAL EVIDENCE
B and W
Scratchers remove mud cake, and here is how to prove it
1. Run B and W Scratchers on your casing.
2. Move the casing after it reaches bottom.
3. Circulate until returns from bottom reach the shaker screen.
B and W
Nu-Coil Scratcher
B and W
Rotating Scratcher
THERE IT IS! . .
You will see all the evidence you need to convince you that B and W Scratchers and Centralizers have conditioned the hole . .
For a GOOD CEMENT JOB

B and W Inc.
Well Completion Specialists

GULF COAST
Box 5266
Houston 12, Texas
Phone WA-3-6603

WEST COAST
Box 3751
Los Angeles 54, Calif.
Phone DA-4-1106

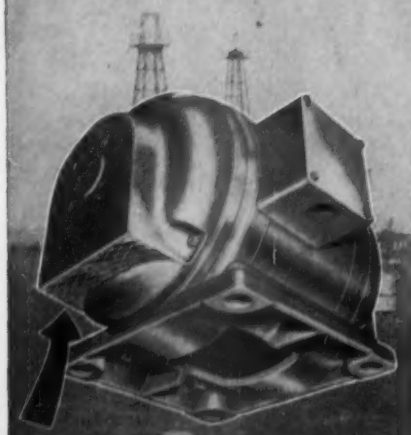
get ALL the facts

and you'll choose

FIELDMASTER

BALL BEARING

MOTORS



Like a book, you can't tell a motor by its cover; it's what's inside that counts.

FIELDMASTER Ball Bearing Motors, for example, have been specially designed and built to more than handle the rugged requirements of oil field use. High slip is available to take care of reciprocating load requirements encountered in pumping . . . wide variety of windings provides triple ratings, dual voltages . . . high torque licks heavy starting problems . . . high-grade silicon steel in the magnetic circuit reduces iron losses . . . heavy-duty, double-shielded pre-lubricated bearings increase performance, reduce lubrication problems . . . heavy cast base assures alignment stability.

These are just a few of the many facts which prove FIELDMASTER Ball Bearing Motors are second to none. Our distributor, the Bethlehem Supply Company, will gladly supply you with ALL the facts . . . without obligation. May we have them contact you?

Screened Air Port Keeps Out Rodents!

VALLEY ELECTRIC CORP. 4221 FOREST PARK BLVD., ST. LOUIS, MO.

Distributor, BETHLEHEM SUPPLY CO., TULSA, OKLA.

HIGH CAPACITY

Lightweight PUMPS

2" Gorman-Rupp pump in Field Processing Plant Construction job.

MIDGET 1½"

PELICAN 2"

HAWK 2"

EAGLE 3"

QUICKEST PRIMING — HIGHEST PRIMING

FASTEST PUMPING — NON-CLOGGING!

Built for hard service. Five years without repair — three months' continuous runs without shutdowns are not uncommon. Saving in time alone repays their cost to many users in the petroleum industry.

Lightweights range in size from 5,850 to 18,000 G.P.H.

Ask for bulletin 7-LW 13

Mid-Continent and Gulf Coast Oilfield Representative

HENRY H. PARIS DISTRIBUTOR, INC.

1125 ROTHWELL STREET, HOUSTON, TEXAS

A COMPLETE LINE OF CENTRIFUGALS IS AVAILABLE UP TO 240,000 G.P.H. CAPACITY.

THE GORMAN-RUPP COMPANY

MANSFIELD, OHIO

was at the rate of 5,200,000 cu. ft. of gas per day with condensate recovery 8 bbl. per 1,000,000 cu. ft. of gas. Flowing pressure through ⅜-in. choke was 1,850 psi. Bottom-hole pressures gaged 3,170 psi., flowing, and 3,460 psi., shut-in.

The upper zone was rated good for 4,900,000 cu. ft. of gas per day, open flow. Condensate recovery was 4 bbl. per 1,000,000 cu. ft. of gas. Pressure through ⅜-in. choke was 1,800 psi. Bottom-hole pressures gaged 2,790 psi., flowing, and 3,370 psi., shut-in.

Location is in Block 1, Jackson Subdivision, El Melado Grant. Superior Oil Co. is offsetting the discovery about 2,000 ft. southeast at its 1 John Shary, Inc.

Poth Sand Produces In New Wilson County Area

Hugh Kirkpatrick and associates have a new oil-discovery well 4½ miles west of Sutherland Springs, in northern Wilson County. It is their 1 Laughlin, in the El Paso Irrigation Co. Survey, completed on the pump for 75 bbl. of 34°-gravity oil per day from the Midway-Poth "A" sand, perforated at 1,578-84 ft.

ROCKY MOUNTAIN

UTAH

Dakota Discovery Indicated West of Rangely

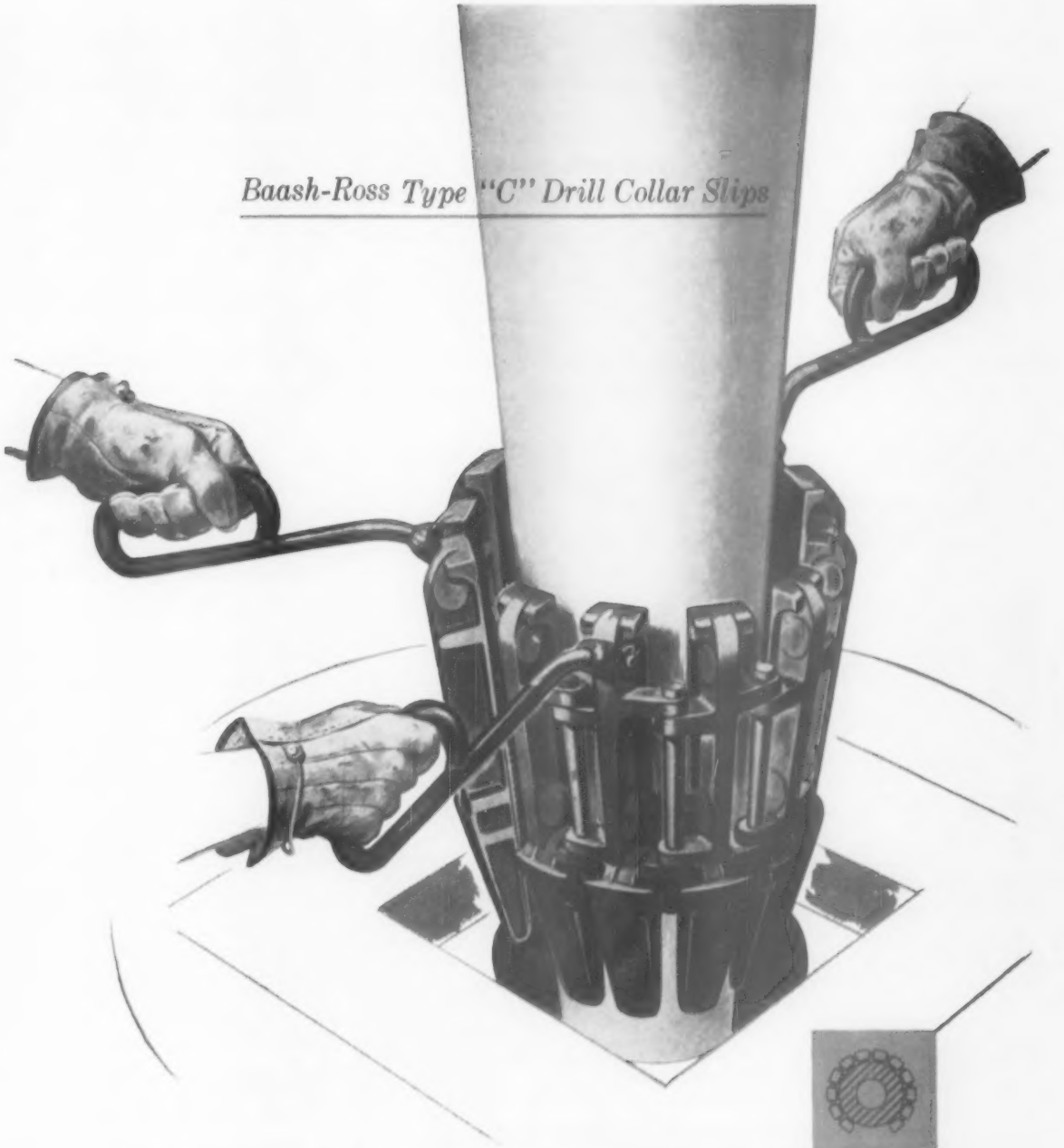
New World Oil, Inc. has reported recovery of oil and gas on test of Dakota at a wildcat 10 miles west of Colorado's Rangely field, and 3 miles inside the Utah line. The well is 1 Taylor-Government, Lot 3, 3-7s-25e, Uintah County.

Test was of perforations in the approximate interval 7,565-7,600 ft. Gas flowed after 12 minutes, and oil after 15 minutes. The operator reported a flow rate of 75-100 bbl. per hour, with an estimated 5,000 M.c.f. of gas per day. However, 200 bbl. of oil was spotted in the hole after it practically unloaded when perforated. Estimate of recovery was made more difficult, according to the operator, by high winds. Tool was open 1 hour, with no pressures reported.

A good show was also reported in upper Morrison by the operator, and the well will be tested in this zone, with the possibility of a dual completion.

While there has been scattered drilling through the general area, there has been no definite campaign to develop possible "satellite" production around Rangely field.

Baash-Ross Type "C" Drill Collar Slips



The slips that *automatically* compensate for drill collar wear.

They wrap around the collar and give the same full grip whether the collar is new or worn, round or out-of-round.

They provide the safest way to support drill collars in the table!

BAASH-ROSS TOOL COMPANY

DIVISION OF JOY MANUFACTURING COMPANY

Los Angeles, Calif. • Houston, Texas • Odessa, Texas • Oklahoma City, Okla. • Casper, Wyo. • Olney, Ill. • Edmonton, Alb., Canada • New York City

COLORADO

Larimer County Lakota Discovery Testing

McElroy Ranch Co. swabbed 10 bbl. of oil per hour from Lakota at 1 Bunker, C SE SW 29-5n-68w, Larimer County. Test was of perforations at 5,550-56 and 5,613-36 ft. The 10 bbl. per hour recovery was over a 24-hour swabbing period. Operators are now installing pump.

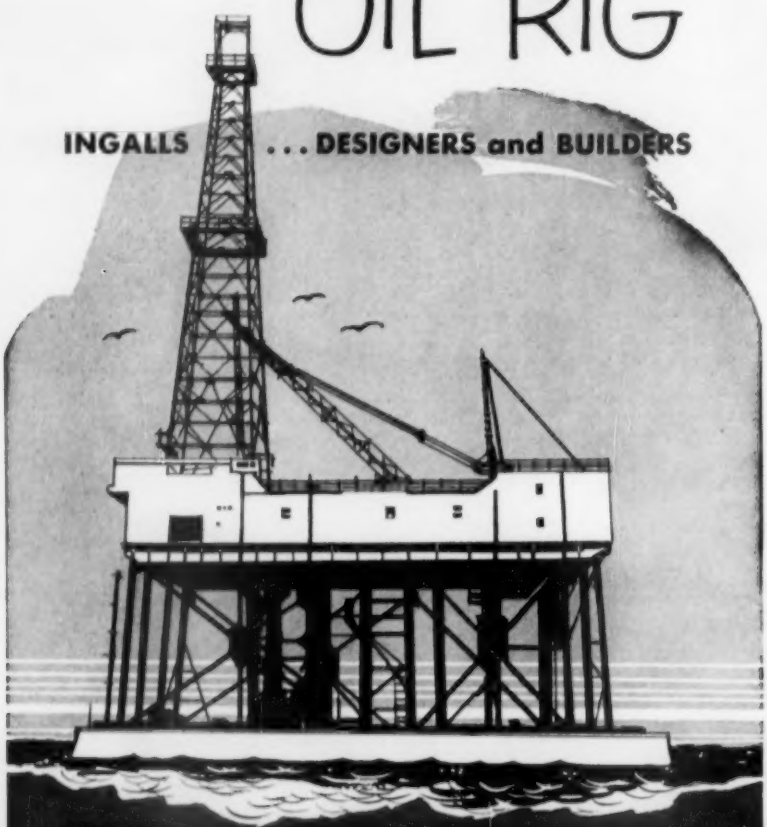
The discovery is 1 mile northeast of Loveland gas field, and 18 miles south of nearest Cretaceous oil production at Fort Collins field. Test in Dakota at the McElroy well recovered only gas-cut mud with a small amount of gas.

Washington County Discovery Near Completion

New Drilling Co. has swabbed at the rate of 7 bbl. of oil per hour and is installing pump at 1 Schreiber, C SW SW 25-3s-56w, in Washington County. Test was of perforations at 4,979-82 ft. in "J" sand. The well is 5 miles southeast of Big Beaver field.

Seagoing OIL RIG

INGALLS ... DESIGNERS and BUILDERS



FOR COMPLETE INFORMATION, WRITE:

The INGALLS Shipbuilding Corporation

BIRMINGHAM, ALABAMA

NEBRASKA

Kimball County Apparent Discovery Tested

Maxey Drilling Co. recovered 1,200 ft. of free oil on drill-stem test at 1 Hein, C NW NW 33-14n-55w, in Kimball County. Test was at 6,278-6,306 ft., and flowing pressure at the end of the 1½-hour interval was 240 psi.

The operator has abanded pipe. The well is 1 mile northwest of Dietz field.

Ohio Completing Cheyenne County Discovery

Ohio Oil Co. has set 7-in. pipe at 1 Spearow, S½ NE NE 23-15n-49w, Cheyenne County. The operator recovered 3,670 ft. of oil on 1-hour test of "D" sand at 4,450-62 ft. Total depth is 4,996 ft. in Morrison. The discovery is 1½ miles north of Preble field, also discovered by Ohio.

WYOMING

Grieve Unit Well Is Indicated Gas Discovery

Forest Oil Co. recovered gas at the rate of 5,260,000 cu. ft. per day on test of 12-21-2 Dumbbell Ranch, NW SE NE 21-32n-85w, in the Grieve Unit, Natrona County.

Test at 6,178-6,203 ft. was in the Muddy zone of Thermopolis shale, the same formation which has produced oil in the six successful wells completed on the 25,000-acre unit. The current well is the first to indicate gas production on the unit. Oil producers have gaged from 900 to 1,500 bbl. per day initially, to make the field, discovered, in 1954, one of the more prolific in the Wind River basin.

Hogsback Unit Discovery Flows Gas From Two Zones

Flow of gas at the rate of 10,000-15,000 M.c.f. per day was gaged by General Petroleum Corp. at its Frontier sand discovery on the Hogsback Unit, Sublette County. The well is 87-19 Unit, NE SE SE 19-27n-113w. Production is from both first and second Frontier sands. The discovery is 4 miles southeast of production from both Frontier and Nugget in the Tip Top area.

New Denver-Julesburg Area Discovery Indicated

C. M. & W. Drilling Co. is testing an apparent discovery near Pine Bluffs in Laramie County. The well, 1 Wilhelm, C NE SE 30-14n-60w, swabbed

at the estimated rate of 5 bbl. per hour after Sandfrac of the interval 7,418-34 ft. in "J" sand. Pump is now being installed. The well is ¾ mile northeast of a discovery completed in 1951 in "D" sand, and later abandoned after decline in production. The earlier well also had "J" sand shows, but completion was not attempted in this formation.

Deep Powder River Basin Wildcats Staked

Locations have been made for two wildcats in the deep portion of the Powder River basin. Aires Oil Co., Wichita Falls, Tex., has made location for 1 Federal NE NE NW 20-48n-76w, in Johnson County. Projected depth has not been reported, but the well is ¼ mile north of a 13,681 ft. failure drilled by Pure Oil Co. in 1952. Top of Sussex sand was found in the earlier well at 8,090 ft.

In Converse County, C. C. Thomas, Denver independent staked location for 1 Government, C SW SE 34-34n-69w. It is also in the deep portion of the basin, 3 miles north of a 1953 failure which went to total depth of 13,987 ft. with reported shows in Fort Union and Dakota.

The central area of the Powder River basin has had relatively little exploration, but large lease spreads have been held there during the past 4 years.

MONTANA

Hill County Wildcat Recovers Free Oil

The Texas Co. recovered 60 ft. of clean oil, 70 ft. of oil and gas-cut mud and 61 ft. of heavily oil-cut mud on drill-stem test of Sawtooth at 1 De Martin, C NE SW 34-34n-9e, in the Rudyard area of Hill County. Test was at 3,370-92 ft. Tool was open 1½ hours, and flowing pressure at the end of the test was 45 psi.

Shows in Sawtooth in this north central area of the state are common, but in past drilling there has been little or no porosity where oil was found in the formation. Where porosity has been present, the formation has usually carried water.

A drilling program through this general section of the state has been carried on by Amerada Petroleum Co. and DeKalb, Northern Oil Division over the past 2 years, with no success.

The Texas Co. was last reported running logs at the current wildcat, with total depth approximately 3,432 ft. Oil recovered was 16° to 17° gravity, but the free oil recovery makes the test the most encouraging in the recent history of this Montana area.

Montana Powder River Basin Also Gets New Activity

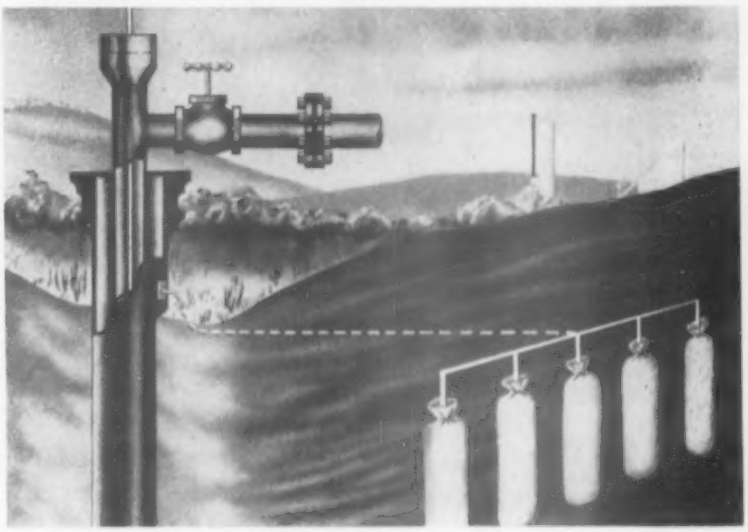
Pure Oil Co. has made location for two widely separated rank wildcats in the Powder River basin in southeastern Montana. The company will drill 1 Government NE SE 8-9s-50e, in the Bay Horse area of Powder River County. It is scheduled to test Shannon at about 3,800 ft. Closest previous drilling is 14 miles northeast, where Gulf Oil Corp. drilled a 9,062 ft. failure in 1952.

In Custer County, Pure made location for 1 Government, NE SW 32-7n-47e. It is a scheduled 5,400 ft. test of lower Cretaceous. Location is 6 miles south of the town of Miles City.

NORTH DAKOTA

New Divide County Test to Be Drilled

Phillips Petroleum Co. and R. M. Ballard have made location for 1 Braathen, NE NW 29-162n-95w, in Divide County. Location is 20 miles north and a little west of production in Tioga field. Projected depth is 7,200 ft. Divide County has had previous drilling, but has been inactive during the past year.



OIL WELL CASING PROTECTED

An economically feasible method is now being used to protect the casing in oil and gas wells from external corrosion. Either magnesium anodes or rectifiers are used for cathodic protection.

Pioneers in this work are engineers of CSI. Completed last month are CSI installations on 100 wells for three major oil companies. Anodes were used on some of these wells, rectifiers on others.

The latest procedures involve the plotting of polarization curves based on surface measurements. CSI engineers have developed special instruments for these surface measurements. The polarization curves are used to determine the current required for protection.

CSI engineers then design the most economical installation—using either anodes or rectifiers—depending primarily on soil conditions. Of special interest in this connection is Galvomag, The Dow Chemical Company's new high-potential anode. This anode seems especially suited to casing protection when applied in the new special sizes and shapes now available.

CSI engineers will be glad to work with you on programs to protect your wells. They offer expert consulting, engineering, design and installation services—also a complete line of brand-name cathodic protection equipment and supplies. Call or write today for competitive estimates or quotations.

CSI

CORROSION SERVICES INCORPORATED

Tulsa, Oklahoma

P. O. Box 7343, Dept. 13 Telephone: Gibson 7-0082

Slim Hole Series Started In Eastern Williston Basin

Carter Oil Co. has started a slim hole series aimed at evaluation of a recently acquired block of 165,000 acres in Cavalier County. The series will be drilled with truck mounted equipment. Number of wells projected is not reported. The first test is in 30-162n-58w. Previous drilling in the general area has found top of Ordovician Red River at slightly more than 2,100 ft.

Successful Wildcats

ALBERTA

Canadian Export Gas-Sun 10-9 Brooks, LSD 10, 9-20-16w4. Bow Island and Sunburst gas well. TD 3,804 ft.

Texaco A-1-22 Compeer, LSD 1, 22-33-1w4. Indicated Mississippian oil well. TD 4,050 ft.

Hudson's Bay et al 1 Forestburg, LSD 11-42-15w4. Glauconitic gas well. TD 4,578 ft.

Canadian Export Gas et al 11-34 Jenner, LSD 11, 3, 4-20-7w4. Viking gas well. TD 3,946 ft.

Imperial 13-15 Burbank, LSD 13, 15-39-27w4. Viking oil well. TD 5,304 ft.

Mobil-CPR 17-7 Crawling Valley, LSD 7, 16-23-18w4. Basal Blairmore oil well. TD 4,412 ft.

Oilwell Operators-C&E Harmatton, LSD 9, 5-32-4w5. Mississippian gas well. TD 9,149 ft.

Western 22-10 Figure Lake, LSD 10, 22-63-18w4. D2 gas well. TD 2,266 ft.

CALIFORNIA

San Mateo County: Union Oil Co. 1 Richfield-Costa, SE NW 14-8s-3w, IPP 81 BOPD, 14/64-in. choke, perfs. 2,060-2,206 ft., 43° gravity, TD 3,804 ft. (New field discovery, Butano sand Oligocene age, 7 miles west of the town of Saratoga in the Santa Cruz Mountains.)

COLORADO

Washington County, Hardway field: Wytex Service Co. 2 Dorothy Williams, C SW SW 17-3n-51w, IPP 41 BOPD, "D" sand discovery, new field. TD 4,625 ft. "J" sand.

North Xenia: Wytex 1 Larson, C NW SW 7-2n-53w, IPP 20 BOPD, "J" sand discovery, new field. TD 4,943 ft. "J" sand.

SOUTH LOUISIANA

Beauregard Parish: Tennessee Gas Transmission Co. and Harry Hurt 1 Lutcher-Moore, 9-7s-11w, shut-in gas well, no gage, perforations 4,714-17 ft. (Frio). TD 6,708 ft. (New field).

Calcasieu Parish: Richardson & Bass 4 Cal-Amelia Stout Conrad et al, 36-8s-8w. IP 116 BOPD, 6/64-in., 42.4°, perforations 9,421-27 ft. TD 10,280 ft. (New pay in Gillis field).

Cameron Parish: Fifteen Oil Co. 1 Cameron Parish School Board, 16-15s-5w. Shut-in gas well, no gage, perforations 11,829-31 ft. TD 13,024 ft. (New field, or major extension in Grand Chenier area).

St. Charles Parish: Humble Oil & Refining Co. 1-U LL&E, 27-13s-19e. IP 6,234 M.c.f. daily and 55 BCPD, ¼-in., 47.8°, perforations 11,101-112 ft. TD 12,142 ft. (New field).

NORTH LOUISIANA

Lincoln Parish: Wheless Drilling Co. and Hudson Gas & Oil Corp. 1 Dowling, 1½ miles west of Simsboro in 19-18n-4w. IP 980 M.c.f. of gas per day plus unestimated amount of condensate per million, 53.7°, Travis Peak 8,238-49 ft. TD 8,430 ft. (Gas-condensate discovery.)

MICHIGAN

Oceana County: Muskegon Development Co. 1 Westberg, et al, SW NE NE 30-13n-16w. IPP 14 BOD, Traverse lime 1,857 ft., TD 1,860 ft. (New pool.)

St. Clair County: Panhandle Eastern Pipe Line Co. 1 Tucker, Comm., SE SE SW 10-3n-16e. IPF 20 BOD, Basal Salina A-1 dolomite 2,164 ft. Pay 2,176-97 ft. TD 2,428 ft., BPTD 2,203 ft. (New pool.)

MONTANA

Glacier County: Kewanee Oil Co. 1 Hagan, SW SW SW 36-37n-7w. IPP 78 BOPD, Madison discovery, new field. TD 3,740 ft. Madison.

SOUTHEAST NEW MEXICO

Plateau Oil Co. 1 British American-State 12-18s-33e. IPP 31½ BOPD, 36°, pay 5,062 ft. TD 5,513 ft.

NORTHWEST NEW MEXICO

Rio Arriba County: Gunsight Butte Uranium 1 Florence, SW NE NW 4-25n-3w. IP 10,154 M.c.f. of gas per day, Pictured Cliffs sand discovery, new field. TD 3,926 ft.

Get more footage at lower cost with

SPANG

ALLOY-STEEL

Weldless Jars

. . . forged from ONE PIECE of Alloy Steel

NO WELDS TO BREAK . . .

Each SPANG WELDLESS JAR is forged from a single piece of selected alloy steel and is scientifically heat-treated and tempered to obtain proper hardness and toughness in the rein sections for maximum strength and wear resistance in the most severe drilling service.

The joints, heat-treated and precision machined, are stronger and more durable, assuring fewer fishing jobs. Records over the years show up to four times more footage with SPANG Alloy-Steel WELDLESS JARS.

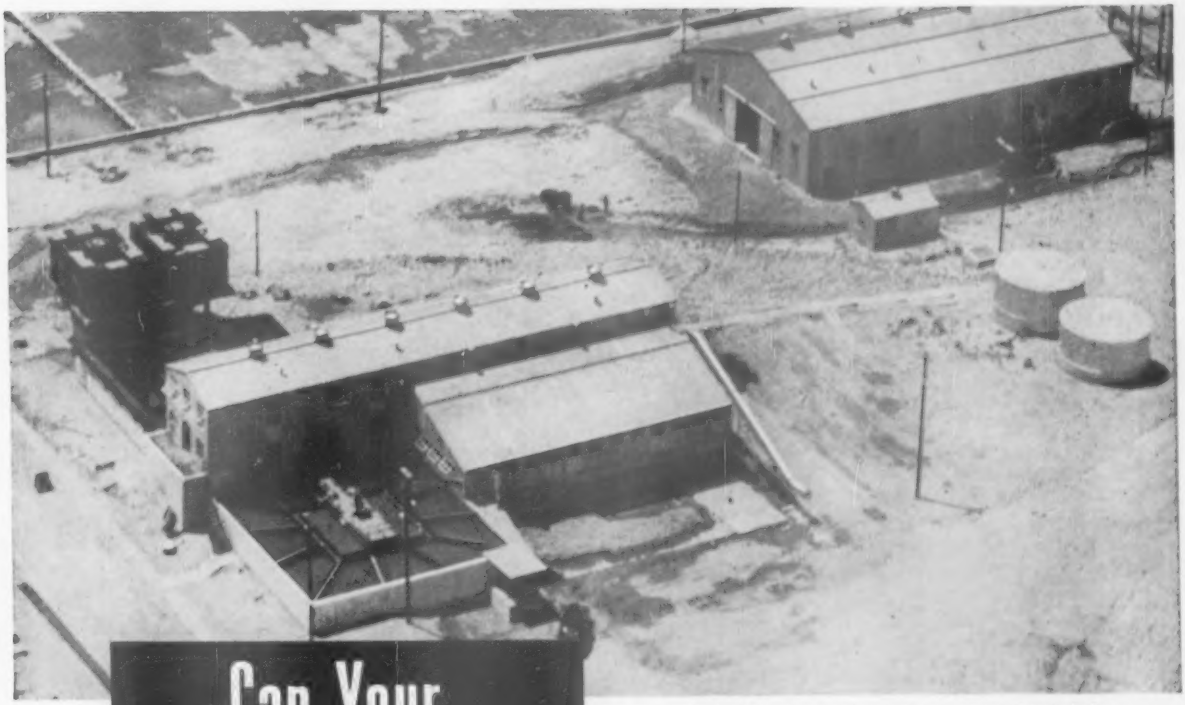
For further information on weldless jars, and for FREE CATALOG of other SPANG cable tools, contact your nearest Dealer or write direct to:

The HIGHER STANDARD

SPANG & COMPANY

DEPT. O-1 • BUTLER, PENNSYLVANIA

For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.



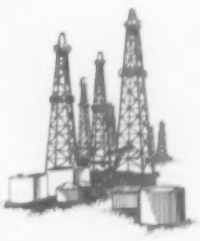
Typical INFILCO flooding water treatment plant includes: Forced Draft Aerators; "ACCELATOR" Treating Plants; Chemical Feeders and INFILCO Gravity Filter Plant.

Can Your Flooding Water Meet this Test?

1. Chemical stability
2. Oil content zero
3. Iron Content 0.2 parts per million
4. Turbidity 1 part per million

If not—you may be jeopardizing the success of your flood!

Most operators agree that these standards for the flooding medium (water, produced brine, or both) are necessary for minimizing clogging of the input formation. Closed systems, or other types of partial treatment, seldom meet these exacting requirements. INFILCO *complete* treating plants, which include the highly efficient ACCELATOR® Stabilizer, provide water within the specified limits. Existing INFILCO installations are treating over 500,000 barrels per day with three-way economy: lower first cost, lowest maintenance and low, low chemical costs. INFILCO engineers have over 30 years experience in designing *complete* flooding water treatment plants. Be sure you are getting maximum oil recovery by consulting your nearby INFILCO engineer. If you prefer, write for complete information.



INFILCO INC.

915 S. Campbell Ave., Tucson, Arizona

Offices in Principal Cities in North America 5808

INFILCO

The one company offering engineered equipment for all types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.

OKLAHOMA

Carter County: Blackwood & Nichols 1 Rhodes, SE SW SW 8-5s-1w, extension well, ½ mi. SW Lone Grove. IPP 75 BOPD, 33°, Viola 4,770-5,192 ft. TD 5,558 ft.

Cleveland County: Powell Briscoe, Inc. 1 Mary Sudik, SE SW 4-10n-4w, 1 mi. NW Short Junction. IP 1,008 BOPD, 20/64-in., 37°, Hunton 7,928-71 ft. TD 8,022 ft.

Jefferson County: G. E. Cameron, Jr., 1 Anderson, SE NE NW 14-6s-6w, extension well, ¾ mi. NW Springfield. IP 120 BOPD, 20/64-in., 35°, pay 2,302-12 ft. TD 2,835 ft.

SASKATCHEWAN

Shell A-13-18 West Halbrite, LSD 13, 18-6-12w2. Indicated Charles oil well. TD 4,776 ft.

EAST TEXAS

Rusk County: Sohio Petroleum Co. 1 Adams, Z. B. Garrison Sur., A-342, 1 mi. S Caledonia. IP 1,840 M.c.f. gas, open flow, Rodessa 6,056-60 ft. TD 7,912 ft.

TEXAS PANHANDLE

Ochiltree County: The Texas Co. 1-A Cutter, 920-43 H&TC Sur. IP 32,082 M.c.f., plus 5 bbl. 61° distillate per 1,000 M.c.f., pay 7,947-86 ft. TD 8,050 ft.

WEST TEXAS

Martin County: Pan American Production Co. 1 Shook, Labor 9, Lge. 259, Borden CSL Sur., 15 mi. SW Lamesa. IP 1,781 BOPD, ½-in., 41.5°, TP 225 psi., GOR 41, Devonian 12,109-118 ft. TD 12,118 ft.

Ward County: Ken Regan & Associates 2 Edwards, 197-34-H&TC, 5 mi. NE Barstow. IPP 42 BOPD, 38°, Delaware sand pay 4,801 ft. TD 4,824 ft.

NORTH TEXAS

Hardeman County: Bert Fields 1 Self, 48-10-H&TC, 3 mi. N Chillicothe. IPP 15 BOPD, 42°, GOR 100, conglomerate 6,320-34 ft. TD 6,495 ft.

Taylor County: Rhodes Drilling Co. 1 Boyd, 36-19-T&P, ½ mi. E Trent. IPP 109 BOPD, 38°, GOR 200, Noodle Creek lime 2,654-58 ft. TD 2,730 ft.

SOUTHWEST TEXAS

Brooks County: Mills Bennett est. 19 Mills Bennett est., Palo Blanco Ysidora Guerra Grant, A-258. IP 62.27 BOPD, ¼-in., 46°, perforations 6,012-15 ft. TD 6,150 ft. (New pay in Mills Bennett field.)

Duval County: Arnold O. Morgan 1 Parr-Moffett, Lot 28, La Huerta Grant, A-227. Shut-in gas well, perforations 3,070-73 ft. TD 4,012 ft. (New field.)

TEXAS GULF COAST

Calhoun County: Southern Minerals Corp. and Seaboard Oil Co. 2-A Traylor, Juan Maldonado Sur., A-120 (1 mile west of Olivia field). IP 195.03 BOPD, ⅛-in., 38.5°, perforations 8,333-38 ft. (Melbourne sand). TD 8,851 ft. (New field—separated from Olivia field by faulting.)

Colorado County: H. J. Chavanne, trustee, 1 Stovall et al, J. T. Dilley Sur., A-855. IP 19,300 M.c.f. daily, open-flow potential, GLR 58.8 M.c.f. per barrel, 55°, perforations 6,381-90 ft. (Cockfield). TD 6,873 ft. (New reservoir—1½ miles south of Nada field.)

Hardin County: Sinclair Oil & Gas Co. 20 South Hampton Unit, H. Binns Sur., A-6. IP 9,000 M.c.f. daily, open-flow potential, GLR 28,940 cu. ft. per barrel, 60.6°, perforations 7,788-96 ft. (F-2 Yegua sand). TD 8,300 ft. (New pay in South Hampton field.)

Kleberg County: Southern Minerals Corp. 1 State Tract 380, Laguna de Los Olmos. IP 173.41 BOPD, 9/64-in., 41.8°, perforations 7,328-34 ft. TD 8,452 ft. (New pay in Sarita field).

Victoria County: J. M. Flaitz and R. B. Mitchell 1 Keeran Ranch, Share 1, Martin De Leon Sur., A-74. IP 9,800 M.c.f. daily, open-flow potential, GLR 114 M.c.f. per barrel, 59.2°, perforations 5,941-42 ft. TD 7,533 ft. (New field.)

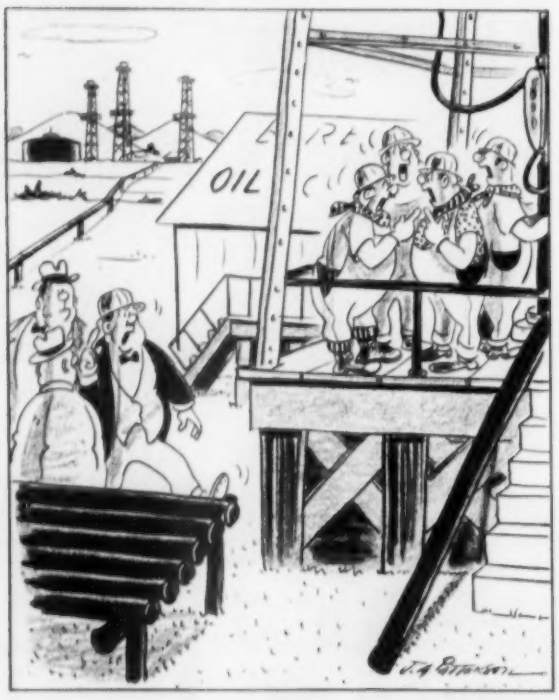
WYOMING

Natrona County, Raderville Unit: Continental Oil Co. 1 Unit, C SE SE 36-35n-89w. IPP 30 BOPD, Raderville sand discovery, new field. TD 6,848 ft. Alcova.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR. Bureau of Land Management, Land Office, Cheyenne, Wyoming. Notice is hereby given that approximately 3958.48 acres of land in nine parcels within the known geologic structure of the Midway Field, Wyoming, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2:00 P. M., MST, December 15, 1955, when bids will be opened. Successful bidder(s) will be required prior to issuance of lease(s) to reimburse the Bureau of Land Management a proportionate share of the amounts advanced for costs of publication. Details of the lease offering, and how and where to submit bids, may be obtained from the Land Office, Cheyenne, Wyoming. Perry T. Williams, Manager.

THE OIL AND GAS JOURNAL



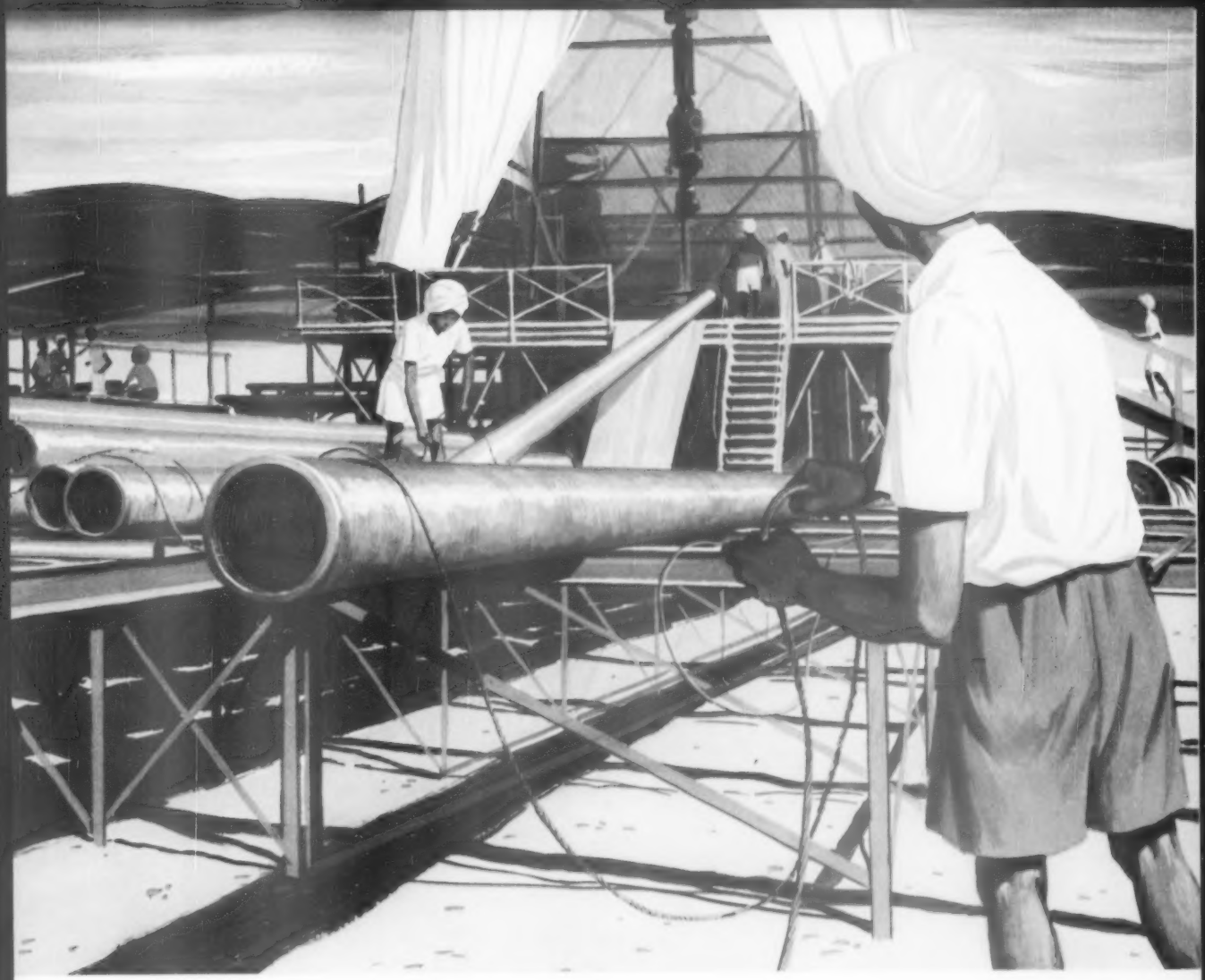
"Excuse me, gentlemen, while I change a subject."

The answer to all of your Diamond Drilling needs

Drilling & Service

DALLAS

OFFICES IN PRINCIPAL OIL AREAS



NATIONAL equipment speeds drilling in India, too

Nahorkatiya field, near the start of the Burma Road, is the first oil discovery in 60 years in territory that is now a part of India. Formations are hard and marked by steep dips, which slow drilling and make it difficult to keep the hole straight.

That's why National Supply was called upon to furnish what are believed to be the world's largest drill collars—a foot across, 50 feet long and weighing 9 tons each. Machined from solid steel rounds at our Torrance, California, plant, these giant collars not only keep the hole straight, but hold the drilling string in proper tension to avoid pipe fatigue failures. Two National rigs, shipped to India in 1948, are also providing efficient service in this field for the same customer.

The Nahorkatiya field is more than 10,000 miles from the U.S.A., but distance is no problem for National. Neither is a hard formation, a monsoon or countless other problems you can find at the end of a long supply line. National men and products team up with operators to conquer all of them.

Whatever their locations and equipment needs may be, oil men the world over know they can rely on National for dependable supply service. Most important, the quality of National's supply service is always the same—whether you're 10 or 10,000 miles from our nearest store or plant. We, and our thousands of satisfied customers, wouldn't have it any other way.

THE
NATIONAL SUPPLY
COMPANY

it's an IDEAL rotary...

engineered to speed the job!

You'll see Ideal Rotaries at work wherever you go in oil country. Like Ideal Rigs, they're engineered with emphasis on ruggedness, safety and durability. And, by enabling operators to work faster and with far less downtime, they perform as well as they look.

Every Ideal Rotary, completely sealed against mud and foreign matter, has these outstanding features:

Spiral bevel gears—Perfectly matched sets have shock-resistant spiral-cut teeth which assure smoother, quieter running.

Proven main bearing—Especially designed for high rotating speeds and heavy loads. Precision ground races are heat-treated for uniform hardness.

Improved pinion shaft assembly—Mounted on roller bearings supported in individual housings on the under side of the base. Entire unit is easily removable for servicing.

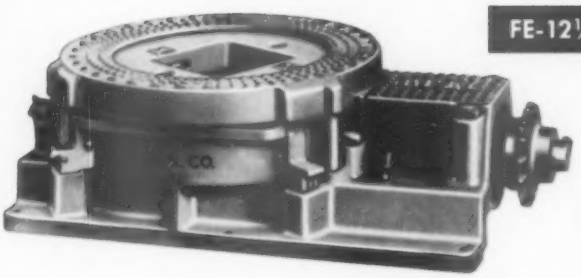
Special mud and oil seals—Double tongue-and-groove labyrinth between table and base prevents entrance of mud or escape of oil. Other special labyrinths prevent entrance of mud into the bearing.

Improved table guard—With a wide, non-skid tread top of original National design. Easily removable guard extends above the table top, thereby deflecting all mud thrown off during rotation.

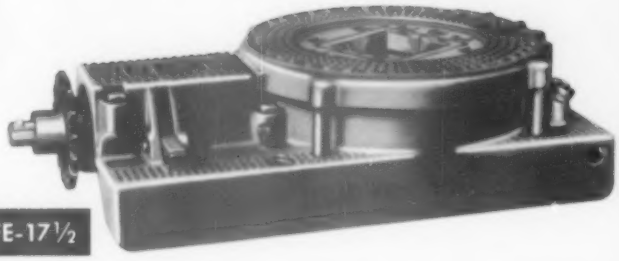
Oil bath lubrication—A continuous action system, induced by rotation of table, insures ample lubrication for all main bearings and gears.

* * *

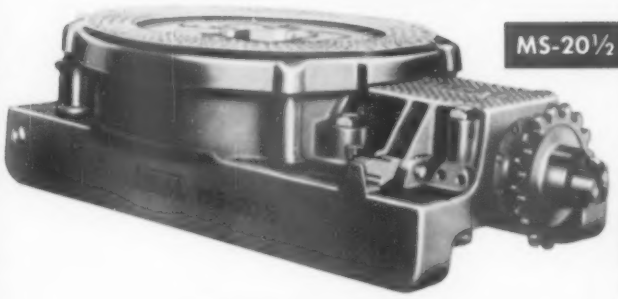
Of course, there's an Ideal Rotary to suit your every drilling need. Check the models shown here, including the famous Ideal Multimatic Rotary. Then ask the National Supply Representative in your area about them soon.



FE-12½

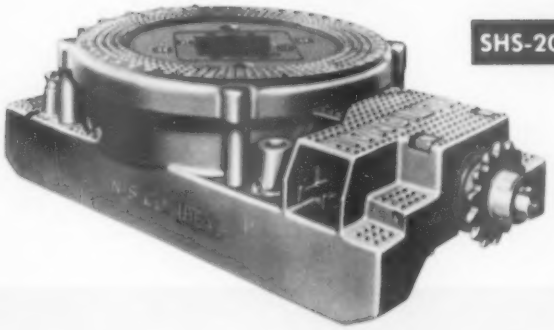


FE-17½

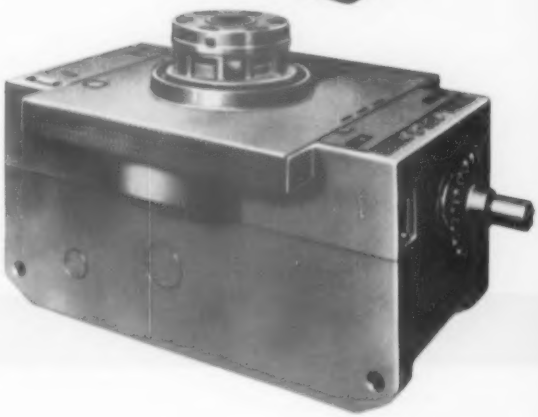


MS-20½

MS-27½



SHS-20½



205-B

Which IDEAL Rotary can you use to reduce drilling costs?

The FE-12½ is a lightweight machine for shallow drilling at average speeds. Made with either 36″ or 44″ spacing between sprocket and table center, it can be used either on narrow width and portable rig hook-ups or on standard derrick installations.

The FE-17½ is designed for shallow to medium depth drilling at moderate speeds. Like the FE-12½, it's adaptable for both portable rig hook-ups and standard derrick installations.

The MS-20½ and MS-27½ are built for deep drilling at medium to high speeds. They offer a selection of either a 20½″ or 27½″ table opening, dependent on the size of the bit or casing to be run. Both have a standard spacing of 53¼″.

The SHS-20½ is designed for high speed operation in deep drilling. It differs from the MS-20½ in that it is built for heavier duty service.

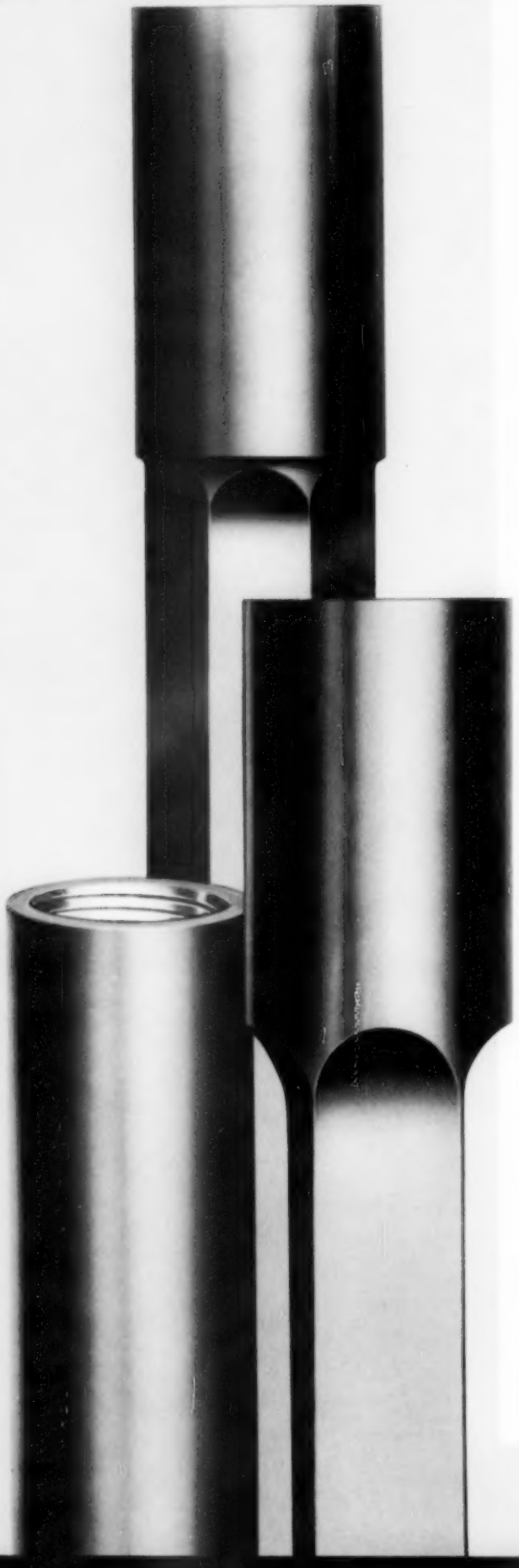
The 205-B MULTIMATIC is built for high speed drilling at any depth, and combines in one unit a modern rotary; built-in, air-actuated long slip-operating mechanism for drill pipe and casing; a new direct-drive kelly bushing; and the equivalent of an automatic casing spider.

THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

ON THE NEXT PAGE—TWO MORE IDEAL PRODUCTS FOR FASTER DRILLING



IDEAL®

KELLYS AND COLLARS

insure faster, longer drill string performance!

Here's why Ideal Kellys and Collars promote maximum penetration rates at all drilling speeds and help to reduce drill pipe failures:

IDEAL KELLYS, in both square and hexagonal types, are precision-manufactured of alloy steel and accurately bored for true concentricity. In use, they provide smoother "feed-off" and the true balance necessary for long drill string life and trouble-free operation.

IDEAL COLLARS, with stress relief grooving in both box and pin, provide maximum fatigue resistance in drill collar joints. Tempered for high strength, accurately bored and precision threaded, Ideal Collars have an outstanding reputation for extreme durability and long-range economy.

Both Ideal Kellys and Collars are readily available in all standard A.P.I. joint sizes from the National Supply Store nearest you. See your National representative soon about the types and sizes to meet your needs!

THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

PERSONALS

Adams' Anniversary

Chairman of Phillips starts thirty-sixth year with firm

K. S. (BOOTS) ADAMS, chairman and chief executive officer of Phillips Petroleum Co., is starting his thirty-sixth year with the company—and with the same enthusiasm that has marked his fast-moving career with Phillips.

Under Adams' leadership, Phillips has joined the exclusive "billion-dollar club" of firms with assets topping $1 billion. He and his fellow executives aren't stopping here. They have many plans in all phases of oil operations to make Phillips even a bigger giant.

The 56-year-old executive has been moving forward in Phillips virtually since the day he joined the company in 1920. At that time, he was fresh out of the University of Kansas, where he was a star basketball player. Shortly after joining the company, he organized a basketball team among company employes that has grown into the famed Phillips 66 Oilers, perennially a national contender in A.A.U. competition.

His first job with Phillips was a far cry from his present position as top man on the totem pole. He joined the company as a warehouse clerk. Adams frankly admits he didn't know an oil well from a water well. But young Boots Adams learned fast.

On the way up . . . In 1926 he was transferred to the accounting department. Within a year he was assistant chief clerk. He moved into the treasury department in 1928 and became assistant secretary and assistant treasurer. By then, he had earned the reputation as a bright, young executive who had a bright future with Phillips Petroleum.

He made another stride forward in 1932. Frank Phillips, then president of the company, had been watching Adams as he acquired a wide knowledge of his young company's operations. He needed a good assistant, one who could make quick but wise decisions. He picked Adams for the job. As assistant to Phillips, Adams was groomed for the key posts he was later to fill.

Frank Phillips moved up to chairman of the board in 1938 and picked his 38-year-old assistant to succeed him as president. Adams took over just before the busy World War II years. During the war, he guided Phillips to new heights. The company became a big avgas producer, a pioneer in synthetic-rubber production, and a continually growing integrated oil company.

When Frank Phillips retired, Adams was named chief executive officer. In April 1951, he was elevated to chairman of the board.

Today, Boots Adams still has the energy that marked his early years with the company. And he also has the business know-how that comes only through years of top, decision-making jobs. The swiftness and sureness with which he attacks his job is reflected by the growth of his company. In 1953 when Phillips became a billion-dollar corporation, it meant the company's assets had increased fourfold in 10 years and doubled in 5 years.

Other activities . . . While Boots Adams is recognized as the driving force behind Phillips Petroleum, he also is known as a leader in the community life of Bartlesville, the small northeastern Oklahoma town where Phillips headquarters. This reputation also is well earned.

Adams is a Bartlesville booster who has given much of his time to the Chamber of Commerce, the local American Legion post, and to other community and civic affairs. He is one of Oklahoma's Masonic leaders, being a 33rd-degree Mason.

The Phillips chairman also is a director of the Tenth Federal Reserve Bank of Kansas City and a director and member of the executive committee of the American Petroleum Institute.

When he can find the time, Adams also is a rancher. He spends much of his leisure at his ranch near Foraker, Okla., where he raises Hereford cattle and conducts a pasture program aimed at developing better grazing land.

Adams and his wife, Dorothy Glynn, also find plenty of running room for their family at the ranch. The couple has five children, Stephen, 8, Kenneth, 7, Gary, 5, Stephanie, 3, and Lisa Ann, 6 months.

Neal Taylor has resigned as district engineer for Plymouth Oil Co. at Midland, Tex., to join Buffalo Oil Co. as district production superintendent at Midland.

D. F. Pflug, chief engineer for Trans-Canada Pipe Lines, Ltd., has been named vice president of the company. Pflug, who will continue as chief engineer, came to Trans-Canada in September 1954 from United Gas Pipeline Co., Shreveport, where he was superintendent of operations. A native of Ohio, Pflug was employed by A. O. Smith Corp. before joining United.

Maurice G. Powers, president of Bed Rock Petroleum Co., Huntington, W. Va., was elected president of the National Stripper Well Association at its annual meeting held last week in St. Louis in conjunction with the Independent Petroleum Association of America's annual meeting. Powers succeeds **J. P. Coleman,** of McCarty & Coleman, Wichita Falls, Tex.

R. L. (Dick) Allbritain, Nowata, Okla., has returned from Tokyo after completing a 2-year appointment as civilian petroleum advisor to the Far East Command. Before World War II he was chief chemist of Great Lakes Pipe Line Co. for 10 years. During the war he served as an oil-industry representative in the Office of Rubber Reserve and later was a private consultant. Allbritain has not yet announced his future plans.

Charles E. Main has been named chief engineer of the eastern pipelines division of Socony Mobil Oil Co., Inc. He succeeds **George F. Brigance,** who is retiring. For the past 3 years, Main has been superintendent of the product pipeline department, central pipeline division in Topeka, Kans. He has been associated with the central pipelines division since joining Socony in 1936

PERSONALS

except for a short stay in Australia in 1954. While in Australia, he assisted in the construction of a product pipeline at the Altona refinery of Standard-Vacuum Oil Co.

Lee Poulson has resigned as geologist for Coppinger Drilling, Inc., to open offices in Wichita as an independent geologist.

Harry H. Lawson, former assistant to the vice president and Rocky Mountain operations superintendent for Seaboard Oil Co., has been named vice president and manager of Candian Seaboard at Calgary.

Percy M. Lyons has joined P. R. Rutherford, of Houston, as district geologist for South Louisiana. Lyons, who will be headquarterd at Lafayette, was formerly assistant division geologist for Sinclair Oil & Gas Co.

R. C. Frederick and **Allen B. Hiatt** have been named vice presidents of Pacific Northwest Pipeline Corp. Fred-

R. C. FREDERICK

A. B. HIATT

erick formerly was coordinator of gas and gas liquids for the production department of Gulf Oil Corp., Pittsburgh. He joined Pacific Northwest November 1. Hiatt was associated with Phillips Petroleum Co. 25 years and was technical adviser to the company's natural gas department. He was on loan from Phillips for several months before his recent appointment as assistant to the president of Pacific Northwest.

A. G. Baillie has been named to a 2-year term as director of the Alberta division of the Canadian Petroleum Association. Other men named to 2-year terms are **R. C. Brown, C. V. Daniels, G. E. Dunlap, B. W. Gillespie, A. T. Jacobson, Paul Kartzke, G. L. Knox, E. D. Loughney, H. R. Moorman, Vernon Taylor, T. W. G. Thomson,** and **O. I. Torkelson.** Directors elected to a 1-year term are **Paul Chaput, J. P. Gallagher, G. H. Gallaway, W. H. Hohag, W. C. Howells, E. H. LaBorde, L. W. Lee, N. W. Nichols, T. Nitescu, C. R. Spencer, and S. Stewart.**

Richard E. Price has been promoted to manager of exploration for Davis Bros., Tulsa consultants. The company also has employed Ralph A. Hockenson, formerly of Carter Oil Co., as supervisor of secondary recovery and evaluations.

H. A. Metzger has been appointed manager of the Dakotas district of the White Eagle division of Socony Mobil Oil Co., Inc. He succeeds the late C. W. Shields. **L. G. Wetzbarger,** of the Iowa district, has been transferred to the Dakotas district as assistant district manager. **John R. Kercheis** has been named assistant manager of the Iowa district.

Dallas R. Lamont, patent counsel for Socony Mobil Oil Co., Inc., since 1931, has been elected to the board of directors of the firm. **William M. Holaday,** who has headed Socony's research and development activities since 1944, has been appointed to a new section as coordinator, new product planning. He joined the company in 1937 as assistant general manager of the firm's laboratories.

E. W. Christian, of Imperial Pipe Line Co., Ltd., has been named president of Westspur Pipe Line Co., which plans to build a 109-mile line connecting the Midale, Sask., with the Interprovincial Pipe Line Co. line at Cromer, Man. Other officers are **W. H. Strong,** Southern Production Co., Inc., vice president; **F. C. Whiteside,** Hudson's Bay Oil & Gas Co., Ltd., vice president; and **F. C. Lantz,** Imperial, vice president.

Charles D. Edwards and **Jack M. Decker** have formed a consulting geologists partnership at Bakersfield, Calif. Both men are former geologists with General Petroleum Corp. and prior to forming the partnership were associates of E. B. Noble. Both partners have experience in California, the Rockies, and Alaska, with emphasis on the San Joaquin Valley and Ventura basin in California.

A. L. Legg has been named supervisor of operations in Division I by Colorado Interstate Gas Co. Legg will be headquartered at Amarillo, Tex., and will supervise operations in the Texas Panhandle and Oklahoma. **K. M. Henderson** at Lakin, Kans., will be in charge of Division II, which will include operations in Kansas and eastern Colorado. **C. T. Crocker** will headquarter at Pueblo, Colo., and be in charge of Division III which includes operations in Colorado, New Mexico, and southern Wyoming. **V. E. Dominick** and **F. I. Gilbert** were named assistants to Henderson, and **J. J. Dolan** was named assistant at Pueblo.

David W. Harris, president of Universal Oil Products Co. for more than 10 years, has been elected chairman of

D. W. HARRIS

M. P. VENEMA

the board and chief executive officer. **M. P. Venema,** executive vice president, has been named president to succeed Harris. Before joining Universal, Harris was president of Arkansas Natural Gas Corp. Venema has been with Universal 20 years.

K. K. Knapp, Jr., former project engineer with Kewanee Oil Co. at Shidler, Okla., has been named to supervise Kewanee's Cree-Sykes unit at Abilene, Tex.

Roger W. Stoneburner has joined San Jacinto Petroleum Corp., Houston, as director of geological operations. He resigned as district exploration superintendent for The California Co. in southeastern Louisiana to accept the new post.

John S. Cameron, Jr., an engineer in the Texas Railroad Commission's gas department at Austin since October 1954, has been named head of the department. Cameron replaces **James A. Hall,** who recently got a 1-year leave of absence to go to Saudi Arabia as a consultant to the government on gas-conservation problems.

P. W. Pitzer, Jr., Breckenridge, Tex., independent, was reelected president of West Texas Oil and Gas Association at the group's annual meeting held recently in Abilene, Tex. Also reelected were three vice presidents, **Thomas S. Cox,** San Angelo independent; **R. C. Grisham,** president of Grisham-Hunter Corp., Abilene; and **E. Bruce Street,** partner in Ibex Co., Graham, Tex. Elected as a new vice president was **Marvin Miller,** senior vice president and director of Cosden Petroleum Corp., Big Spring.

PERSONALS

George E. Dunlap, Sun Oil Co., Calgary, has been named chairman of the Alberta division of the Canadian Petroleum Association.

John M. Sweet has been promoted to assistant to the area geologist for Atlantic Refining Co. in Dallas. He is a former assistant to the regional exploration manager in Midland, Tex.

William W. Ayer, Jr., has been promoted by Atlantic Refining Co. to production engineer at Dallas. Other Atlantic Refining promotions include: **Donald R. Anthony** to junior chemical engineer at Dallas, **Milton Hughes** to reserve analyst at Dallas; **Robert C. LeRoy** to reservoir engineer at Dallas; **Jerry R. McIntyre** to junior chemical engineer at Dallas; **Richard L. Woodhams** transferred from Dallas to Jackson, Miss., and promoted to geologist; **Dempsey L. Langston** to production foreman at Denver City, Tex.; **Robert P. Parke** to geologist at Midland, Tex.; **James I. Wood** to drilling engineer at Odessa, Tex.; and **Marion W. Ziober** transferred from Odessa to Midland and promoted to regional corrosion engineer.

James McCourt, Union Oil Co. geologist at Cut Bank, Mont., has been transferred to Billings, where he will supervise all the company's Montana geological work. **Ed Reid** succeeds McCourt at Cut Bank.

James A. Hall, assistant chief engineer of the Texas Railroad Commission and head of the commission's gas department at Austin, has been granted a year's leave of absence to act as consultant to the Saudi Arabian Government at Jedda, Saudi Arabia. Hall was granted the leave of absence following a recent request made by Sheikh Abdullar Tariki, director of petroleum and minerals of Saudi Arabia, to Commissioner Ernest O. Thompson. Tariki said the country needed help in solving its gas-flaring problems. Hall will be stationed at Bammam. He joined the commission in 1937, and his service has been continuous except for a 4-year hitch in the Marines during the Second World War.

DEATHS

M. A. Abernathy, 62, senior vice president and a director of United Gas Corp., died recently in Shreveport. Abernathy had been with United Gas and predecessor companies since 1920, when he joined Magnolia Gas Co. He became superintendent of measuring and general engineering in 1924, then in 1930 went to Houston as general pipeline superintendent for United Gas when it bought Magnolia. In 1937 he became vice president and director of United Gas Pipe Line Co., and was named vice president of United Gas Corp. 10 years later. At his death he also was president of Escambia Bay Chemical Corp.

Robert C. Bearden, 58, executive vice president of Sinclair Pipe Line Co., died November 3 of a cerebral hemorrhage. Bearden, of Independence, Kans., was stricken while vacationing at Grand Lake, Oklahoma. Bearden joined Prairie Pipe Line Co. in 1917, was employed at Sinclair-Prairie's Tulsa offices for many years, and in 1943 was named assistant to the executive here. When Sinclair Pipe Line Co. was formed in 1951, Bearden was elected vice president and director in charge of all crude pipelines. In 1953 he was chosen executive vice president and a director.

H. H. Wagner, 56, superintendent of Stanolind Oil & Gas Co.'s South Houston district, died November 5 in Houston.

Jack Kelley, 50, district manager of Associated Oil Field Rentals, died of a heart attack recently in Oklahoma City.

Grady H. Vaughn, 65, who as a Dallas independent operator and drilling contractor became one of the nation's best-known oil men, died November 8 in Dallas. Vaughn was owner of G. H. Vaughn Production Co. He started in the business as a driller for The Texas Co., later moving to Sims Oil Co. as production superintendent. He left Sims to become an independent. During World War II Vaughn served as director of production in Petroleum Administration for War, District No. 3.

Clyde W. Shields, 59, district manager of Socony Mobil Oil Co., Inc., in the Dakotas, died recently of a heart attack at his home in Aberdeen, S. D. Shields had been in Aberdeen since Socony moved its district office there in 1936. He was a veteran of 36 years' service with the company.

Albert Huber, 74, Wolf Point, Mont., oil operator, died recently in Moosbank, Sask. He was a partner in Thomas-Huber Co. and held interests in four producers in the Williston basin's East Poplar field.

Ralph C. Warner, 89, former treasurer and a director of Standard Oil Co. of California, died recently in Oakland. Warner entered the oil business early in the century and was retired in 1930.

Felton Thrasher, 46, superintendent of Triangle Refineries, Inc., storage plant near Birmingham, Ala., was killed November 2 by an explosion in his apartment.

Harry Neeley, 85, for many years a Mid-Continent drilling contractor, died recently in Laredo, Tex.

John L. Sullivan, 72, San Antonio, well-known Texas wildcatter, died recently in Rochester Minn. Sullivan's discovery of Agua Dulce gas led indirectly to a long court battle when one of his wells burned for more than a year, damaging surrounding lands. The incident caused insurance companies to change their policies on coverage of oil and gas wells.

Frank A. Edson, 75, retired consulting geologist, died November 7 in Chillicothe, Ohio. Edson at one time was a professor of geology at the University of Oklahoma. He gained recognition for his mapping of undrilled areas in Mexico's Golden Lane.

Clyde E. Galbreath, 73, pioneer Tulsa drilling contractor, died recently in an Abilene, Tex., hospital. Galbreath began drilling operations near Tyro, Kans., in 1904, and continued in the Mid-Continent area until 1935, when he retired.

Milton Paul Laurent, 59, Houston oil field equipment inventor and mechanical engineer, died November 6 at his home. Laurent held patents on the WKM gate valve and other production equipment. He had been a consultant with the Flex Float Co. since 1922.

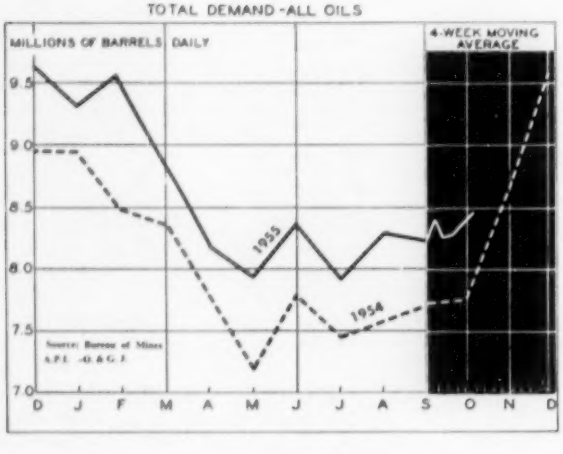
E. H. Beese, retired production superintendent for E. T. Williams Oil Co., Casper, Wyo., died recently at his home in Los Angeles.

W. H. Taylor, 86, Archer City, Tex., oil operator, died November 6 in Wichita Falls. He was head of W. H. Taylor Co., Dalhart.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,825,450	UP	82,375	UP	517,055
Crude stocks	257,514,000	UP	484,000	DOWN	14,671,000
Completions	1,133	UP	50	UP	118
Refinery runs	7,561,000	UP	85,000	UP	620,000
Gasoline stocks	152,004,000	UP	397,000	UP	2,866,000
Distillate stocks	151,988,000	UP	422,000	UP	14,790,000
Residual stocks	45,932,000	DOWN	367,000	DOWN	10,537,000
Four-product stocks	386,368,000	UP	460,000	UP	5,385,000
Total imports	1,276,400	UP	162,500	UP	135,400



Part of This Year's Gain in Crude Production Due to Low Level in 1954

CRUDE production in the last quarter of this year will show a gain of better than 500,000 bbl. daily over the last quarter of 1954. In fact, the entire last half will be up almost 500,000 bbl. daily, but the gains can not be credited entirely to gains in demand. Neither are they due to big decreases in crude imports.

A glance at the table at the bottom of the page will show that most big-gain quarters follow small-gain quarters of the previous year or even quarters for which large losses were reported.

The largest gain for any postwar period was for the first 3 months of 1951. Crude production for that period was up 1,045,000 bbl. daily over the first quarter of 1950, but there was a drop of 408,000 bbl. daily between 1949 and 1950.

It was the low-production quarters of 1954 that made it possible for production to show remarkable gains this year. Crude produced during the year 1954 was 102,000 bbl. daily less than in 1953. This means that the good increase for this year must be spread over more than 2 years.

Another factor in the gain in production this year has been the shift in inventories. If stock changes for the rest of the year follow the normal pattern, total crude and product inventories at the end of December will be about 10,000,000 bbl. above closing stocks of 1954. In contrast, total stocks dopped about 10,000,000 bbl. during 1954. Additional new supply was required this year because part was added to inventories while part of the demand in 1954 was supplied by stocks.

The gain for 1955 is based on a production average for the year of 6,756,000 bbl. daily and this total includes an estimate of 6,820,000 bbl. daily for the fourth quarter. Production for October averaged about 6,745,000 bbl. daily and preliminary reports for the early weeks of this month indicate a production level of about 6,845,000 bbl. daily for November. December is expected to be about 6,870,000 bbl. daily.

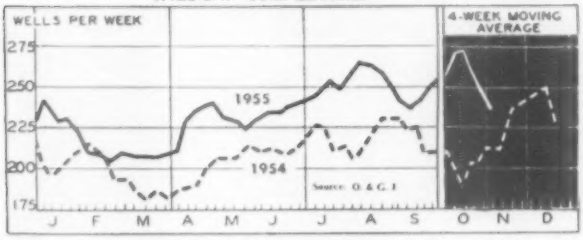
Required supply of new oil to meet demands in 1956 will be up a little more than 4 per cent over the average for 1955. New crude will gain 3.9 per cent but the gain in domestic production will depend on the division of the market between imported and domestic crude.

CRUDE PRODUCTION GAINS OVER SAME QUARTER OF PREVIOUS YEAR

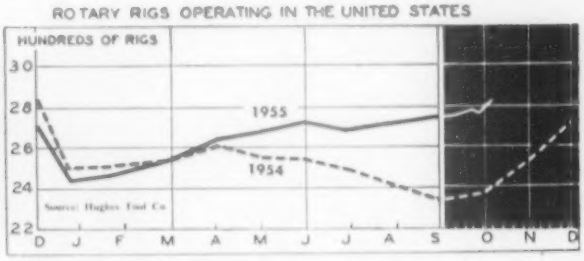
(Thousands of barrels daily

	Quarters			
	First	Second	Third	Fourth
1956 (Forecast)	173	175	284	280
1955	452	197	463	529
1954	163	70	—391	39
1953	222	564	308	—284
1952	345	—255	57	247
1951	1,045	984	535	449
1950	—408	199	878	755
1949	—24	—439	—712	—710
1948	561	366	328	477
1947	210	254	341	539

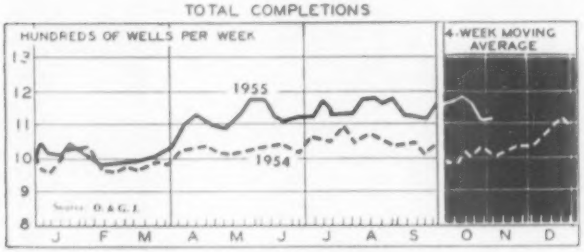
WILDCAT COMPLETIONS



ROTARY RIGS OPERATING IN THE UNITED STATES



TOTAL COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	11-7-55	Change from 10-31-55	Change from 11-8-54
Gulf Coast	599	13	71
N. and W. Texas-New Mexico	955	42	220
Arkansas-N. Louisiana-E. Texas	176	3	—9
Oklahoma	364	5	68
Kansas-S. Nebraska	188	6	29
Illinois-Eastern	134	—11	—3
Rocky Mountain	265	—5	10
Pacific Coast	142	0	6
Total United States	2,823	53	392
Western Canada	201	15	10

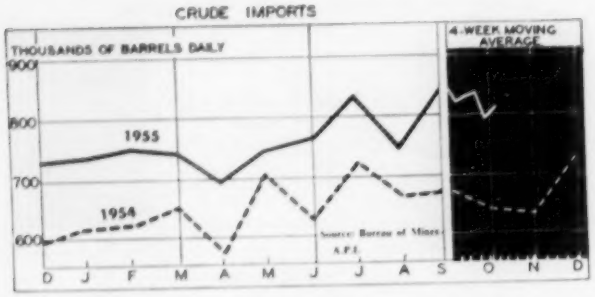
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 5, 1955

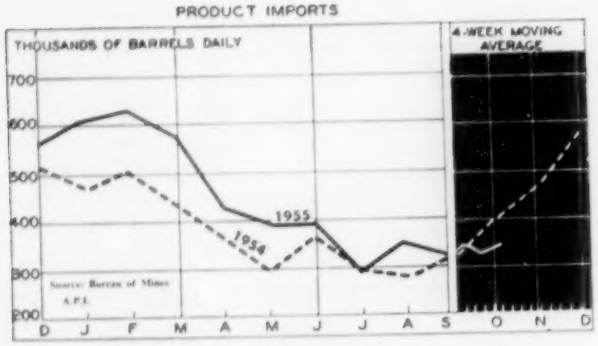
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1955	Cum. 1954	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1955: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	0	0	0	0	0	65	89	0	0	0	0	0	1	0	0	62	63
Arkansas	19	12	0	7	67,497	684	519	0	0	0	4	4	31	1	4	146	182
California	45	31	2	12	207,138	2,066	2,007	1	0	0	7	8	38	0	11	368	417
Colorado	38	11	3	24	216,389	1,269	1,103	2	0	0	16	18	40	0	22	625	687
Illinois	73	39	2	32	179,663	3,279	2,459	2	0	0	9	11	59	0	4	468	531
Indiana	11	7	0	4	14,216	611	692	0	0	0	1	1	11	0	0	229	240
Kansas	88	32	7	49	301,508	4,250	3,796	4	0	0	22	26	120	1	30	709	860
Kentucky	36	17	1	18	46,501	1,325	971	1	0	0	15	16	49	0	9	276	334
Louisiana	97	56	7	34	610,953	3,410	2,911	3	2	2	16	23	100	71	28	389	588
North	58	31	3	24	213,402	1,764	1,594	0	1	0	11	12	22	11	4	164	201
South	39	25	4	10	397,551	1,646	1,317	3	1	2	5	11	78	60	24	225	387
Michigan	10	4	1	5	33,507	455	477	2	0	0	1	3	11	0	1	175	187
Mississippi	15	6	0	9	102,311	384	351	0	0	0	7	7	14	0	0	137	151
Montana	21	6	3	12	69,088	341	283	1	0	0	5	6	13	0	1	129	143
Nebraska	21	11	0	10	117,978	744	368	0	0	0	6	6	38	0	1	305	344
New Mexico	41	15	21	5	172,530	1,435	920	1	0	1	2	4	35	2	10	96	143
Northwest	22	0	21	1	84,911	488	329	0	0	1	1	2	5	1	10	28	44
Southeast	19	15	0	4	87,619	947	591	1	0	0	1	2	30	1	0	68	99
North Dakota	8	5	0	3	68,728	219	257	0	0	0	2	2	6	0	0	55	61
Ohio	14	9	2	3	28,021	1,019	987	0	0	0	0	0	3	0	7	16	26
Oklahoma	169	104	4	*61	507,355	7,170	7,485	2	0	0	13	15	123	15	25	563	726
Pennsylvania-New York	24	8	8	†8	42,863	1,285	1,928	0	0	0	0	0	0	0	7	10	17
Texas	373	230	11	132	1,682,051	17,053	15,650	9	3	2	79	93	656	93	111	3,492	4,352
Southwest (1 & 4)	73	36	4	33	287,767	2,638	2,187	2	0	1	22	25	101	30	34	674	839
Gulf Coast (2 & 3)	63	30	3	30	408,179	2,147	2,210	2	3	0	18	23	77	51	35	567	730
East (5 & 6)	21	9	3	9	91,806	832	830	0	0	1	8	9	21	4	9	281	315
North Central (7-B & 9)	118	71	0	47	372,830	6,357	5,962	2	0	0	22	24	318	0	14	1,374	1,706
West (7-C & 8)	80	72	0	8	445,956	4,185	3,634	2	0	0	6	8	134	1	10	565	710
Panhandle (10)	18	12	1	5	75,513	894	827	1	0	0	3	4	5	7	9	31	52
Utah	0	0	0	0	0	79	74	0	0	0	0	0	6	0	6	49	61
West Virginia	13	2	7	4	37,329	547	519	0	0	0	1	1	0	0	10	18	28
Wyoming	17	7	0	10	87,339	772	1,065	1	0	0	6	7	23	0	7	181	211
Miscellaneous	0	0	0	0	0	57	108	0	0	0	0	0	4	0	2	46	52
Total United States	**1,133**	612	79	442	4,592,965	48,519	45,019	29	5	5	212	**251**	1,381	183	296	8,544	10,404
Total previous week	1,083	621	65	397	4,334,822			23	4	4	186	217	1,352	178	291	8,332	10,153
Total November 6, 1954	1,015	533	91	391	3,882,489			26	3	9	160	198	1,209	118	337	7,620	9,284
Western Canada	99	65	11	23	404,022												

Service wells included: *6, †4.

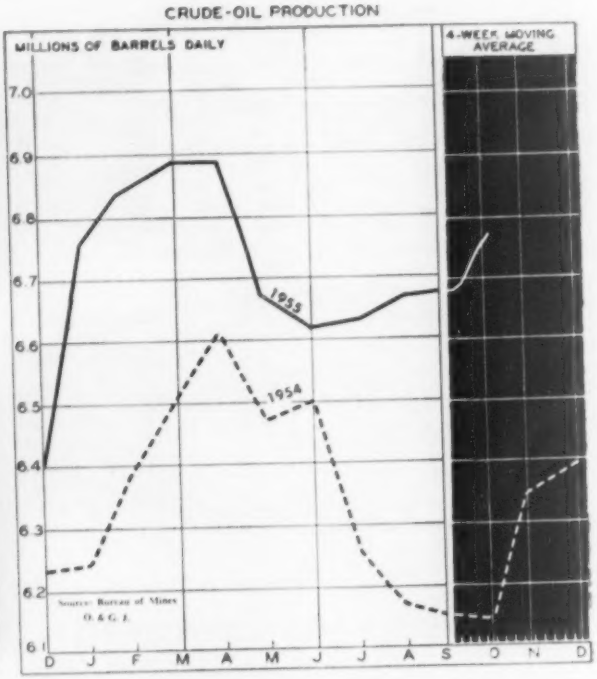
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

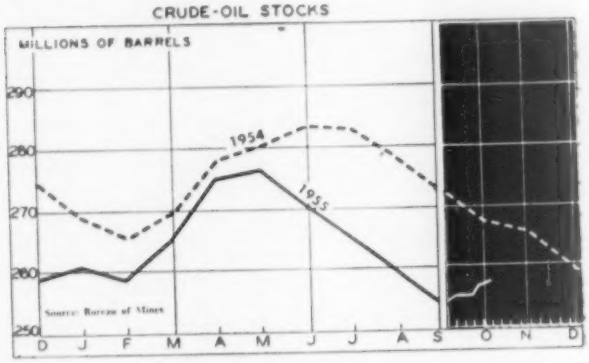


DAILY AVERAGE PRODUCTION FOR WEEK

	November 5			Oct. 29
	Crude oil	Lease condensate	Total	total
Alabama	4,000		4,000	4,200
Arkansas	73,950	400	74,350	74,000
California	973,100		973,100	975,800
Colorado	151,500		151,500	150,000
Eastern	52,100		52,100	50,800
Florida	1,350		1,350	1,375
Illinois	231,200		231,200	231,400
Indiana	29,800		29,800	29,800
Kansas	317,900		317,900	335,000
Kentucky	43,800		43,800	43,400
Louisiana	699,400	57,900	757,300	754,250
North	112,400	2,900	115,300	115,250
South	587,000	55,000	642,000	639,000
Michigan	32,000		32,000	29,150
Mississippi	104,450	4,700	109,150	107,300
Montana	40,600		40,600	41,900
Nebraska	30,200		30,200	28,100
New Mexico	277,525	3,550	281,075	228,500
North Dakota	19,100		19,100	24,800
Oklahoma	544,800		544,800	547,100
Texas	2,803,800	50,925	2,854,725	2,811,600
Dist. 1	52,275	525	52,800	50,475
Dist. 2	148,100	7,975	156,075	151,625
Dist. 3	408,000	24,500	432,500	431,025
Dist. 4	238,150	5,150	243,300	242,100
Dist. 5	49,575	425	50,000	51,400
Dist. 6	124,275	5,300	129,575	127,950
East Texas field	216,500		216,500	212,500
Dist. 7-B	149,000	50	149,050	149,050
Dist. 7-C	167,850	4,300	172,150	169,100
Dist. 8	949,475	2,000	951,475	930,800
Dist. 9	210,600	500	211,100	205,400
Dist. 10	90,000	200	90,200	90,175
Utah	6,300		6,300	6,000
Wyoming	270,900		270,900	268,400
Others	†200		‡200	200
Total U. S.	6,707,975	117,475	**6,825,450**	6,743,075
Change from previous week, up			**82,375**	
Canada	†375,225		†375,225	†416,100
Total U. S. production January 1-November 5			2,082,006,500 bbl.	
Same period last year (crude plus cond.)			*1,959,476,950 bbl.	

*Includes 30,052,850 bbl. condensate. †Week ended previous Monday. ‡S. D. 100, Nov. 100

CRUDE-OIL STOCKS



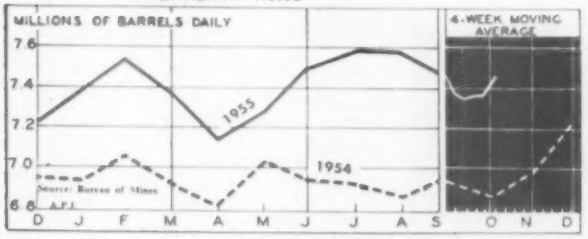
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

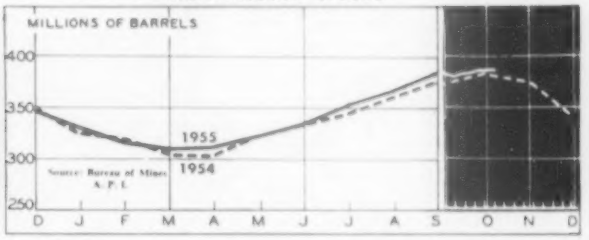
	10-29-55	10-22-55	10-30-54
Pennsylvania Grade	3,206	3,252	3,210
Other Appalachian	1,867	1,917	1,949
Illinois, Indiana, Michigan	9,401	9,353	12,421
Nebraska, North Dakota	2,574	2,537	1,971
Kansas	8,083	8,063	8,556
Oklahoma	20,932	20,717	26,758
Arkansas	2,328	2,415	3,048
Louisiana	15,913	16,151	15,185
North	2,483	2,461	2,500
South	13,430	13,690	12,685
Mississippi	3,057	3,191	3,005
New Mexico	7,305	7,277	8,526
Texas	121,838	121,846	126,259
East Texas proper	9,521	9,353	10,416
West Texas	57,190	57,167	56,617
Texas Gulf	25,505	25,644	24,741
Other Texas	29,622	29,682	34,485
Wyoming	14,808	14,223	13,092
Other Rocky Mountain	5,832	5,798	5,705
California	27,132	27,150	32,288
Foreign	13,238	13,140	10,212
Total	257,514	257,030	272,185

*Bureau of Mines. Includes 2,479,000 bbl. in California.

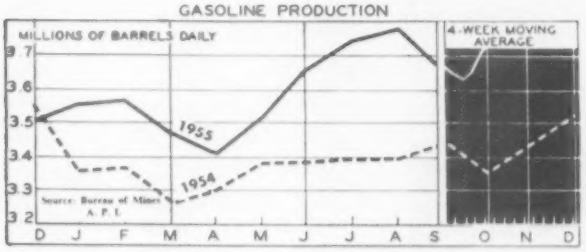
REFINERY RUNS



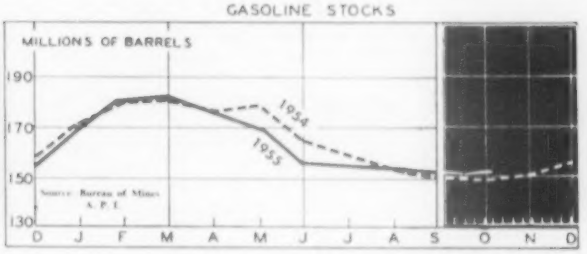
FOUR-PRODUCT STOCKS



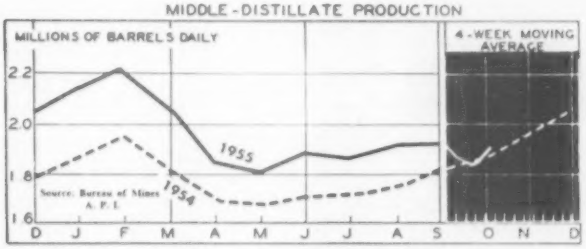
GASOLINE PRODUCTION



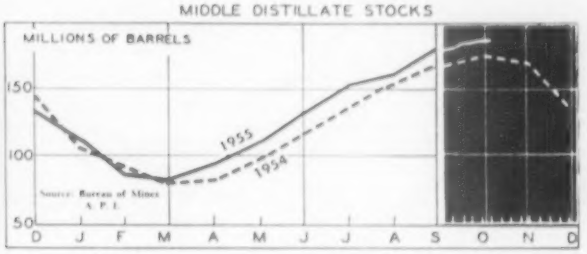
GASOLINE STOCKS



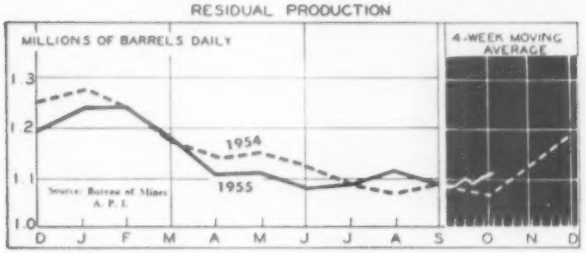
MIDDLE-DISTILLATE PRODUCTION



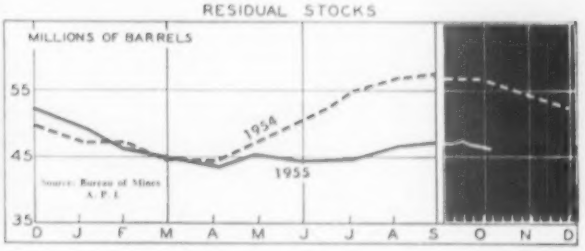
MIDDLE DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



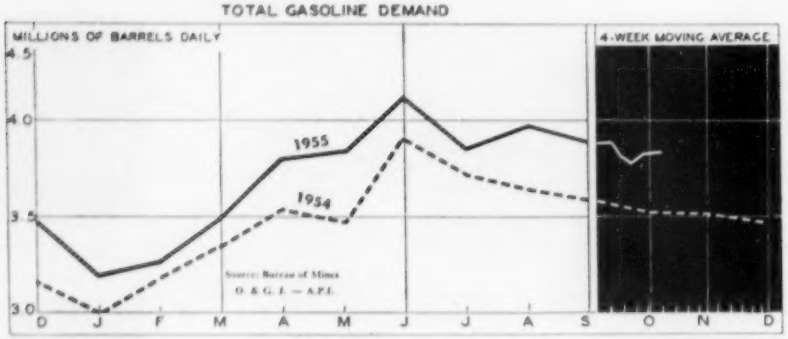
A.P.I. REFINERY REPORT, NOVEMBER 4

(Thousands of barrels)

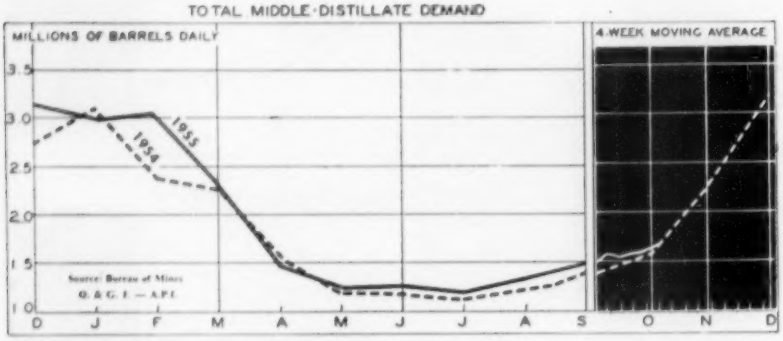
District—	Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.	Stocks‡ — Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1954 — Daily avg. runs	Daily average production — Gaso.*	Kero.	Dist.	Resid.
East Coast	1,110	463.9	34.0	293.8	207.8	35,694	15,383	58,418	13,322	989	417.6	28.7	267.6	194.4
Appalachian:														
District 1	107	41.3	4.0	22.6	4.6	4,280	697	3,304	563	93	44.0	5.3	19.9	6.5
District 2	100	51.1	5.7	17.0	15.6	2,310	609	1,173	478	74	33.4	5.9	12.4	8.4
Ind., Ill., Ky.	1,324	740.0	57.1	264.6	147.7	31,060	9,012	29,936	5,126	1,267	670.6	77.6	264.8	168.5
Okla., Kans., Mo.	686	392.0	13.4	160.0	30.3	14,707	2,285	15,401	1,473	623	352.6	17.4	160.7	38.0
Inland Texas	241	189.7	7.1	49.0	21.4	5,564	490	2,935	1,352	224	176.9	9.2	40.9	22.6
Texas Gulf Coast	1,887	916.3	122.6	481.1	264.3	19,910	3,618	16,949	6,879	1,754	824.0	128.7	443.9	233.5
La. Gulf Coast	684	345.1	71.6	136.0	42.3	8,656	2,640	5,880	1,296	603	311.7	64.8	164.5	39.7
N. La. and Ark.	96	37.4	6.0	24.7	6.0	3,917	977	2,319	76	88	38.0	7.4	22.5	6.6
Rocky Mountain:														
New Mexico	21	10.6		4.0	2.7	212	7	52	34	20	11.2	0.7	3.1	3.1
Other Rocky Mtn.	241	113.4	0.9	58.3	38.6	4,963	355	2,817	909	227	108.5	3.9	53.7	33.6
California	1,064	475.3	7.7	159.0	372.4	20,731	371	12,804	14,424	1,013	439.9	4.4	168.2	364.9
Nov. 4, 1955	7,561	3,776.1	330.1	1,670.1	1,153.7	152,004	36,444	151,988	45,932	6,975	3,428.4	354.0	1,622.2	1,119.8
Oct. 28, 1955	7,476	3,867.9	292.9	1,607.1	1,115.9	151,607	36,436	151,566	46,299					
Nov. 5, 1954	6,941	3,295.6	342.1	1,475.7	1,119.9	149,138	38,178	137,198	56,469					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

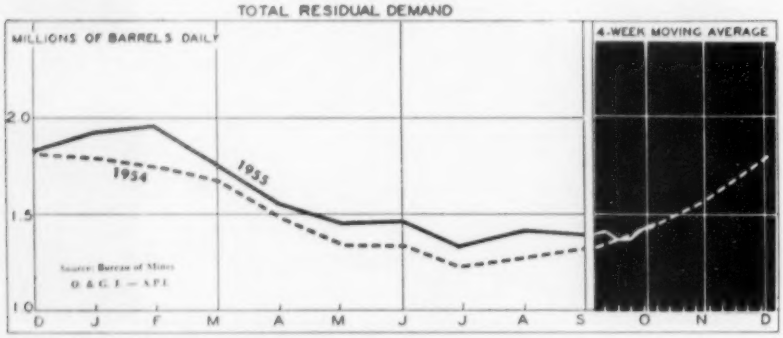
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of November 9, 1955. Prices are in cents, per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11-11.25	11.5-12	10.5-10.75
Premium gasoline	12.5-12.75	13-13.75	12-12.25
42-44 w.w. kerosine	9.25-9.50	10.05	8.75-9.00
No. 2 straw fuel oil	8.25-8.50	9.55	8.5-8.75
No. 6 residual	$1.75-1.85	$2.55-2.75	$2.10-2.20

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6.0	5.5	5.75
Grade 18-55	7.2	6.7	6.95

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14.25

WAX

Mid-Continent

132-134 A.M.P.	0.6

• The split price for natural gasoline in North Texas returned to a normal differential compared with Group 3 on November 3. The North Texas price for Grade 26-70 now is 5.5 cents a gallon. Colder weather in the North Central states has boosted movement of No. 2 out of pipeline and river terminals. With the cool air mass moving toward the East Coast, sales in that area should increase.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 11-4-55	3,756	3,829
August 1955	3,858	4,033
October 1954	3,362	3,515
November 1954	3,428	3,505
Middle distillate:		
Four weeks ended 11-4-55	1,904	1,694
August 1955	1,910	1,377
October 1954	1,854	1,509
November 1954	1,976	2,247
Residual fuel:		
Four weeks ended 11-4-55	1,116	1,465
August 1955	1,090	1,439
October 1954	1,066	1,429
November 1954	1,120	1,560

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.97			
15-15.9	2.03			
16-16.9	2.09			
17-17.9	2.15			
18-18.9	2.21			
19-19.9	2.27			
20-20.9	2.33	$2.50		$2.37
21-21.9	2.39	2.52		2.39
22-22.9	2.45	2.54		2.41
23-23.9	2.51	2.56		2.43
24-24.9	2.57	2.58	$2.91	2.45
25-25.9	2.63	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Sour. Includes New Mexico Permian.

Effective dates. California, October 17, 1955; east of California, June 15, 1953; Pennsylvania Grade, November 1, 1955.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

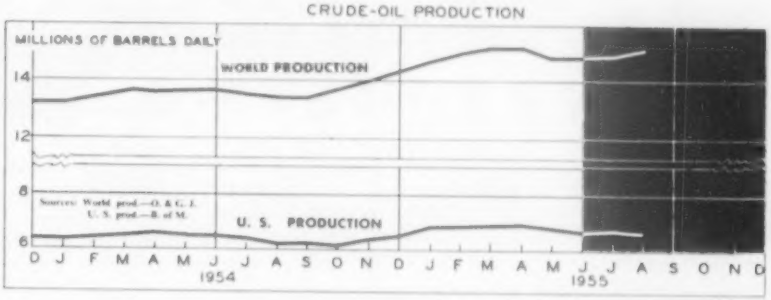
Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.75
Middle District	3.62
Southwest Pennsylvania	3.33
West Virginia	3.21
Buckeye Grade	3.15
Zanesville Grade	2.87
Illinois Basin	3.00

CRUDE PRODUCTION

(Thousands of barrels daily)

Month—	U.S.	World
August 1955	6,665	15,050
July 1955	6,632	14,989
June 1955	6,613	14,813
December 1954	6,394	14,277
August 1954	6,168	13,428

CRUDE-OIL PRODUCTION

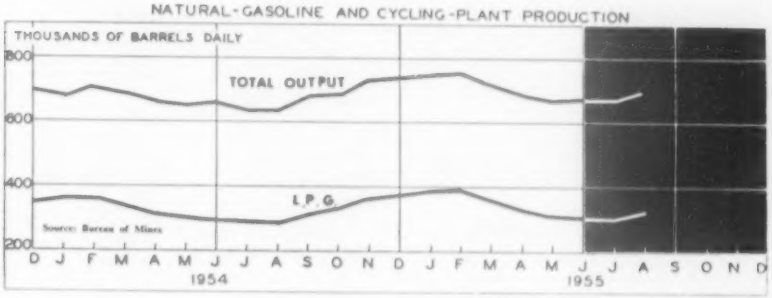

MILLIONS OF BARRELS DAILY
WORLD PRODUCTION
U. S. PRODUCTION
Sources: World prod.—O. & G. J.
U. S. prod.—B. of M.
14
12
8
6
D J F M A M J J A S O N D J F M A M J J A S O N D
1954
1955

PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

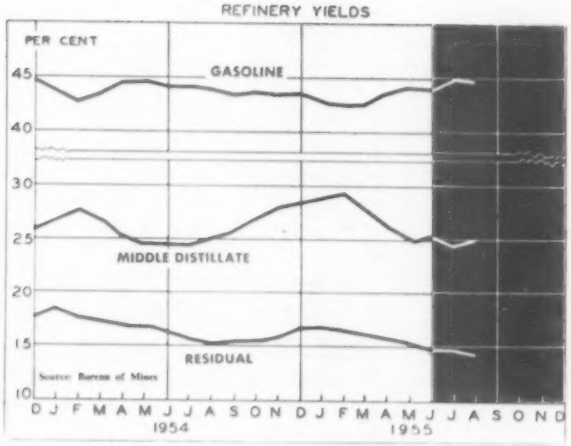
(Thousands of barrels daily)

Month—	L.P.G.	Total
August 1955	328	698
July 1955	316	679
June 1955	313	672
December 1954	372	733
August 1954	289	642

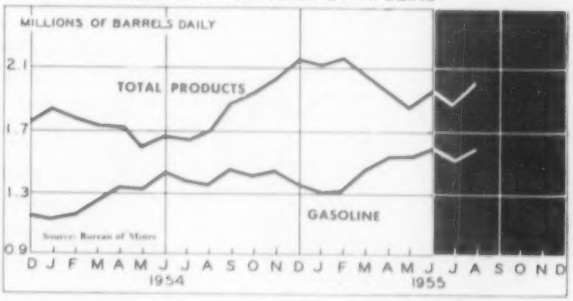
NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



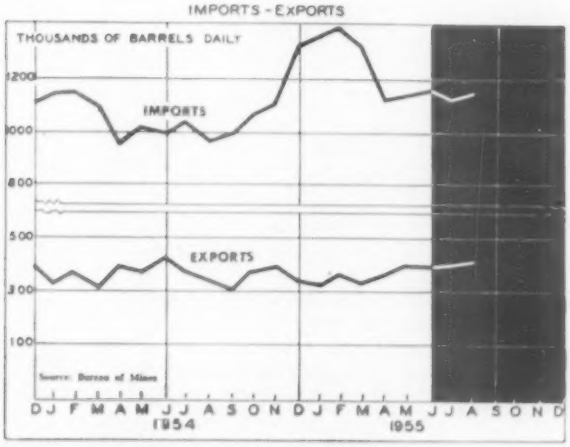
REFINERY YIELDS



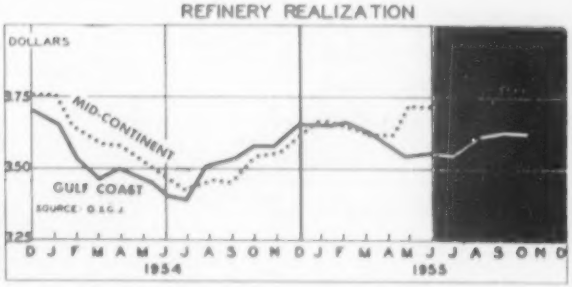
PRODUCTS DELIVERED BY PIPELINE



IMPORTS - EXPORTS



REFINERY REALIZATION



REFINERY REALIZATION

	Oct.* 1955	Sept.* 1955	Aug. 1955	Oct. 1954
Mid-Continent	$3.77	$3.78	$3.77	$3.55
Gulf Coast	3.62	3.63	3.63	3.58

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$16.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

GARDNER-DENVER two-stage gas compressor unitized unit powered by 250 H.P. Buda motor and all equipment, gauges and coolers necessary to operate. All in first-class condition. Gulf Southwest Service Co., P. O. Box 1328, Shreveport, La. Telephone 2-8428.

CORE DRILLS, SPUDDERS, ROTARIES. New and used equipment. Everything in supplies. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE at our Wichita gasoline plant, 11 33-in. O.D. by 43-ft. high welded absorbers filled with 3-in. triple-spiral tile, 450 lbs. working pressure. Also 14 30-in. O.D. by 41-ft. riveted absorbers with triple-spiral pipe, 400 lbs. test pressure. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Used R. L. Cardwell Drilling-in Unit. Splendid condition with all accessories and large Doghouse. Located near Wichita. Phone or write John Richard, McClelland Hotel, Wichita, Kansas; or write Box 361, Topeka, Kansas.

NEW TRAILERS

DROP—BED "TYPE" $2,731.48
FLAT—BED "TYPE" 2,638.89

Plus 8% Tax

Built To Order

PASKO MACHINERY & STEEL
1721 CHICAGO DRIVE S. W.
GRAND RAPIDS, MICHIGAN

FOR SALE
12" Line Pipe

(IMMEDIATE DELIVERY)

200,000 ft. 12¾" O.D. x .375 Wall, 49.56#, Lapweld, All Machine Cleaned, Straight, App. 20' SRL, Ends Beveled, Used Good Condition

SUITABLE FOR
Oil, Water, or Gas Systems.
Water Well Casing, Irrigation Pipe.
Piling or Structural Use

Located: Kansas and Missouri

Large additional quantities same size available soon from present take up and reconditioning operations in Missouri.

Priced Attractively for Prompt Shipment

Humboldt-Chicago Pipe Line Project

125 W. 3rd St. Tulsa, Okla.
CHerry 2-9128 LUther 4-4229

FOR SALE EQUIPMENT

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FOR SALE—Our gasoline plant north of Arkansas City, Kansas. Complete details and price furnished upon request. Contact Patridge, Cities Service Oil, Bartlesville, Oklahoma.

USED CATERPILLAR Motor D4 600, good condition; new Kobe 7" pump; three used 7" Lucas pumps. Delivery Falls City, Nebraska. Write: Box 231, Scarsdale, N. Y.

SEISMOGRAPH CABLE TRUCK with special "Sewall" body using 5 cable handlers (Squirts) and 5 cable bins, mounted on 1952 Dodge Power Wagon. Excellent condition. Texas Seismograph Company, Box 2069, Wichita Falls, Texas.

Gasoline Plant Equipment For Sale

3—800# 20 MMCF Absorbers with scrubbers, etc.
2—150 HP 350# WP Lucey Oil Country Boilers Complete with Stacks, etc., and Steel Building.
1—30" x 62' Depropanizer with Accumulator, Reboiler and Condenser.
1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.

Other equipment, Instruments, Pumps, Pipe, Valves and Fittings necessary in Gasoline Plant Construction. Detailed Inventory Available upon request.

SOUTHERN PRODUCTION COMPANY, INC.,
P. O. Box 670, Phone FAnnin 8103, Fort Worth, Texas

FOR SALE EQUIPMENT

COMPLETE ROTARY RIG, 2000 to 4500 feet capacity. 3500 feet 4½" drill pipe, 7¼ x 14 pump, powered by 1335 Buda, and 350 H.P. V-8 Le Roi Engines. Price, $25,000. Phone DIamond 3-0369, Tulsa, Okla.

BUCYRUS-ERIE Spudder—36 L. Buda engine, butane equipped. Auxiliary leg. Tools from 15½" to 5". Completely equipped and ready to drill. Inventory furnished upon request. Robert J. Orr, 1928 Crestview Dr., Bartlesville, Okla. Phone 5427.

FOR SALE
8" Line Pipe

IMMEDIATE DELIVERY

400,000 ft. 8⅝" O.D. x .322 Wall, 28.55#, Lapweld, All Machine Cleaned, Straight, App. 20' SRL, Ends Beveled, Used Good Condition.

3,000—8-V Thread Used Couplings, suitable shopping, 8⅝" O.D. Pipe.

SUITABLE FOR
Oil, Water, or Gas Systems.
Water Well Casing, Irrigation Pipe.
Piling or Structural Use

Located: Kansas and Missouri

Large additional quantities same size available soon from present take up and reconditioning operations in Missouri.

Priced Attractively for Prompt Shipment

Humboldt-Chicago Pipe Line Project

125 W. 3rd St. Tulsa, Okla.
CHerry 2-9128 LUther 4-4229

Announcing Liquidation

OIL REFINERY

We have been awarded the Cabin Creek Refinery by the Pure Oil Corporation, Charleston (Cabin Creek) West Virginia. The entire manufacturing and processing machinery and equipment of this modern plant is for sale.

A complete catalogue of the major components is now being prepared and a copy will be mailed on request. Here is an opportunity to avail yourselves of unusual bargains in Refinery Equipment and supplies.

Before dismantling begins we suggest you visit plant and select units from the largest list of Refinery Equipment offered in recent years.

6,000 BBL. TOPPING; 3,000 BBL. THERMAL CRACKING; 100 BBL. CATALYTIC POLYMERIZATION; LUBE OIL & PARAFFIN WAX PLANT; RERUN UNIT—STORAGE TANKS—BOILER HOUSE; INSTRUMENTS, ETC.

Every item will be sold at a fraction of original cost—Anticipate your needs and save money—visit the plant—salesman on premises. Write for catalogue.

BROWN-STRAUSS CORPORATION
1546 Guinotte Ave., Phone HA. 1000, Kansas City, Mo.

FIELD OFFICE
Cabin Creek, (Suburb of Charleston) West Virginia
Phone East Bank 5611—Mail Address P. O. Box 2921
Roy Crisp, Manager—Charleston, West Virginia

FOR SALE EQUIPMENT

ATTENTION Drilling Contractors—FXQ—7¾x16 Gardner-Denver fluid ends complete. Perfect condition, for sale or trade. Contact: Wichita Pipe & Supply Co. P. O. Box 1803, Wichita Falls, Texas. Phone: 3-8197.

FOR SALE: National T-12 rig on 32' Tandem Trailer, 145 HP Motor, complete except drill pipe. First class condition, approx. 8 months old. Box J-233, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—At Tallant, Oklahoma, three 5' x 56' Absorbers, 20 Trays, 24" Spacing 500# WP, peak design each 40,000 MCFD at 350 PSIG; Oil Rate 100-300 GPM, min. and max. Bought new 1947, taken out of service 1954. Price $8500.00 each, now standing. Full data upon request. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

PORTABLE IRRIGATION UNIT—Mounted on a 6-wheel drive GMC truck. Purchased new in 1951 at a cost of over $22,500. Le Roi engine (Model H-540). Gould pumps. 2500 feet of 8" aluminum pipe, 1500 feet of 6" aluminum pipe. 200 couplers and fittings. All other equipment necessary plus many extras. First-class condition in every respect, used very little. Write Post Office Box 752, Kerrville, Texas.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

LIQUIDATION

COMPRESSOR STATION

4—400 HP IR Type KVG Gas Engine Driven 2 Stage Compressors.

$50,000 New Spare Parts for Above.

3—IR Starting Air Compressors, Model 28C, Type 40, 285#, 67.6 cfm.

TOWERS - COLUMNS

1—6' x 58' x ½" Chrome-lined, 21 Trays
1—6'6" x 65' x ⅝", 17 Chrome Decks, 9 Chrome Baffles
1—3'6" x 49' x 7/8" Shell, 28 Trays, 180#
1—30" x 34'10" x ¼" Shell, 18 Trays

TANKS - VESSELS

6—1250, 1,000 Bbl. Welded and Bolted
10—5-8' x 15', 10 x 20', 6 x 20', 5'3" x 38'6", (Chr. Lin. 90#).

HEAT EXCHANGERS

3—Kellogg 2400 sq. ft. Admiralty, 150# psi.
1—Efco Steel Tube 2000 sq. ft., 150# psi.
6—Efco 785 sq. ft. Adm. heat exchangers, 250#.
1—Griscom Russell Admiralty, 742 sq. ft., 150# psi.
3—Struthers-Wells Admiralty, 425 sq. ft., 150# psi.

ATMOSPHERIC HEAT EXCHANGERS

8—715 sq. ft., 850 psig, 304 Stls. St.
6—470 sq. ft., 850 psig., 304 Stls. St.
13—715 sq. ft., 125 psig, 304 Stls. St.
6—715 sq. ft. Admiralty 125 psig, 300° F

MISCELLANEOUS

1—Lab Petrochem Isoflow Furnace 50,000 BTU/hr.
1—B.J. Hot Oil Pump 3" x 9", 14 stage, 325 gpm, 4620' head, 11-13 nickel chrome impeller, 400 HP st. turbine.
1—Goulds 4" Pump, 400 gpm at 1600' hd.

Partial List Only

WIRE! PHONE! WRITE!

BRILL EQUIPMENT COMPANY

4101 San Jacinto St., Houston 4, Texas, JA 6-1351
Or
2401 Third Ave., New York 51, N. Y., CYpress 2-5703

FOR SALE EQUIPMENT

FOR SALE at our Wichita gasoline plant, 12 10-ft. by 40-ft. riveted and welded gasoline-storage tanks, $750 each. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

EMSCO 250 RIG, complete with Emsco double mast. Excellent condition. 4,000-ft. practically new, 4½-in. drill pipe. Rig now running. Bargain. Phone FOrest 8-5886, 421 Meadows Bldg., Dallas, Tex.

FOR SALE: Complete Oilfield manufacturing, machine shop and supply business. Write W. N. Young, Box 977, Ada, Oklahoma.

I WILSON TITAN DRAWWORKS 40' double hydromatic brake, three L-3000 Le-Roi gas engines, two pump drives. 1—8"x20" Gardner-Denver slush pump with Rod oiler and V-Belt sheave. For prices of this equipment write P. O. Box 497 or phone MAdison 6-7344, Tulsa.

GAS METERS: Foxboro, Emco and Westcott Orifice Meters for sale. Geo. R. Milner, Box 124, Okmulgee, Okla.

5—22" Wallsworth Type 49 Series 600 cast steel OS&Y flange RS gate valves, new, priced right for quick sale. P. O. Box 1858, W. C. Berry, Tulsa, Oklahoma.

FOR SALE: 1½ Steam rigs priced for quick sale, comprising—2 Steam drawworks, 2 300 HP Lucey Boilers, 3 300 HP Broderick Boilers, 1 7x4½x10 Wilson-Snyder Boiler Feed Pump, 1 15½x8½x20 Ideal Pump, 1 14½x7½x18 Ideal Pump, 1 10x4½x10 Oil Well Boiler Feed Pump. Also various engines, swivels, tongs, pipe racks, etc. Will sell complete unit or item by item. Glen Neubert, 1120 Colquitt, Houston, Texas. JAckson 8-1291.

5000 FEET used 8⅝", 28#, T&C Casing; 7500 feet used 2" T&C Line Pipe. Delivered to your location. FADEM PIPE & SUPPLY CO., 325 Mayo Building, Tulsa, Oklahoma. GIbson 7-8068.

TWO BUCYRUS-ERIE 36L's complete. Also string, 15-inch down, big-hole tools. Tut-Tilley, Wewoka, Okla.

FOR SALE: 2 Type 80 Cooper Twin Gas Engine Driven Compressors rebuilt like new ready to go. Compressor Cylinders to suit. Write or phone W. S. Smith, 205 Thompson Bldg., Tulsa, Okla. LUther 2-5473.

FOR SALE—13⅜" Seamless Steel casing couplings, new, prime, perfect, 8 Rd. Thd. Quantity—very attractive price. Box J-224, The Oil and Gas Journal, Tulsa, Oklahoma.

NEED A PIPE LINE

Have 800 Miles 8" Line Pipe we are taking up through Illinois, Indiana, and Ohio. Will furnish pipe, go in on a deal, or finance.

We are open for any kind of deal.

REDNEB OIL CO.

P. O. Box 1798 Shreveport, La.
Phone 2-3276

PIPE 1/8" thru 30"

FASTER THAN FOSTER

TESTED & STRUCTURAL
Large Warehouse Stocks

- SPIRAL WELD
- SEAMLESS
- ELECTRIC WELD
- LAP WELD
- BUTT WELD
- CONTINUOUS

RAILS - TRACK EQUIPMENT - PIPE - PILING

L.B. FOSTER CO.

PITTSBURGH 30 • NEW YORK 7 • CHICAGO 4
ATLANTA 8 • HOUSTON 2 • LOS ANGELES 5

FOR SALE EQUIPMENT

FOR SALE—At our Arkansas City Gasolene Plant—1—31"x61'3" Tulsa Boiler Stabilizer, 35 trays, ¾" flange quality plate shell, ASME code welded, 460# WP at 350° F, stress relieved, with 3'x8' Jacking Engineering reboiler, two Alco 8"x84" and 168" heat exchangers, lowered, lot price $5000.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE—At our Arkansas City, Kansas Gasolene Plant, 3—4'x53'9" Tulsa Boiler Type welded absorbers, 20 trays, 7/8" flange quality plate, ASME code welded 400# WP at 120° F., with piping. Lowered, each $6500.00. Complete data upon request. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE—3000' Drilling Rig—Complete for South Texas Drilling—Completely Overhauled—For Price and Complete Inventory write—McKENZIE DRILLING COMPANY, 717 WILSON BUILDING, CORPUS CHRISTI, TEXAS.

3500 FT. Wilson Rotary Rig complete. Air controlled. 3200 ft. 4½ F. H. Drill Pipe. 4 Drill Collars. 7¼x10 FXO Gardner-Denver Pump. All Butane equipped. Call #2 or #411, Cleveland, Oklahoma.

12" PIPE BENDER

FEDERAL, 2" to 12" cap., COLD NO FILLING OR HEATING, 50 H.P. 3/440 MOTOR. 29 SHOES.

Republic Machinery Company
134 N. 3rd Street, Phila. 6, Pa.
WAlnut 2-5513

CHROME TUBES (NEW),
4-6%, 50% of new cost.
PUMPS—DUPLEX,
from 4x3x4 to 10x7x12.
Hot Oil & Transfer Duty.
TOWERS—COLUMNS
4'x59' 160 PSI 23 trays.
7'6"x41' 160 PSI Reactor.
2'x47' 375 PSI 20 trays.
3'x49' 425 PSI 28 trays.
FURNACES
8 million BTU, chrome tubes (2).
10 million BTU, chrome tubes.
HEAT EXCHANGERS
94—550 sq. ft. Steel Tubes.
140 to 440 sq. ft. Adm. Tubes.
COMPRESSORS
1406 SCFM Gas Driven, 250 PSI.
211 CFM Electric, 100 PSI.
ETHYL BLENDING PLANT
Complete with 4200 gal. tank and scale.
STORAGE TANKS
500 to 20,000 bbl. All Welded.
BOILERS
153 HP 160 PSI Water Tube (3).
250 HP 150 PSI Stirling.
→Write for Complete Inventory←

Heat & Power Co., Inc.

60 East 42 Street, New York 17, N. Y., Murray Hill 7-5280
Pocatello, Idaho, Phone: Poc. 5490

EQUIPMENT WANTED

14-IN. MUD PUMP and motor and other rotary equipment for 4,500 ft. Tut-Tilley, Wewoka, Okla.

USED TOOL JOINTS for 2⅞" EUE tubing. Either 8 or 10 thread. W. H. Doran, Jr. Box 648, Alice, Texas.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED: Graduate electrical, civil or mechanical engineer for office and field work in pipeline division of major oil company in Middle West. Please state age, experience and educational qualifications. Box J-201, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

MAJOR OIL COMPANY has immediate openings for two geologists with Mid-Continent experience. Address Box J-202, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED as Sales Representatives. Retired drilling engineer, familiar with mud problems and drilling. Attractive offer. Exclusive territory. P. O. Box 4183, Station A, San Antonio, Texas.

ENGINERING STAFF openings available for a few progressive young technically trained men, interested in small organization which promotes individual development and advancement, with nationwide underwriting group. Diversified and interesting technical work in contact with major concerns in the Oil, Gas and Petrochemical industries. Some travel involved, with car provided. Prefer men with one to three years experience. Salary commensurate with qualifications and experience. Offices located Chicago, Dallas, Los Angeles, New York, Tulsa. All replies confidential. Box J-245, The Oil and Gas Journal, Tulsa, Oklahoma.

PARTY CHIEFS
SEISMOLOGISTS
COMPUTERS
OBSERVERS

WORLD-WIDE SEISMOGRAPH CONTRACTING ORGANIZATION

offers technical careers to qualified experienced applicants. Highly attractive starting salaries with good opportunities for advancement within both domestic and foreign areas.

United Geophysical Corporation
POST OFFICE BOX "M"
PASADENA, CALIFORNIA

HELP WANTED

SEISMOGRAPH Computer. Must be experienced and free to travel. Box J-234, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL FIELD BLACKSMITH—Nationally known manufacturer of well drilling tools desires blacksmith to work in branch repair shop located in North Central State. Must be experienced in all phases of work, including stem welding, light forging, tempering and case-hardening of steel. State age, qualifications and rate per hour expected in first letter. Box J-232, The Oil and Gas Journal, Tulsa, Oklahoma.

STAFF ENGINEER—Major gas pipeline company in Rocky Mountain area has opening for staff engineer in operating department who has an engineering degree, preferably B.S. in Mechanical Engineering. Two years experience with major engine manufacturer or operating company in engine testing research and development required. Job will consist of planning and conducting tests on compressor engines, to check load and fuel consumption and performance. Should be familiar with technical apparatus used in testing work, make reports and studies of the tests with any recommendations to improve performance or efficiency. Box J-235, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER

Durango, Colo., office Must have degree. Eight to ten years experience in Rocky Mountain area desirable. Capable of supervising personnel and assuming complete responsibility pertaining to drilling and production of wildcat operation. Salary open. Age limit—47. Contact:

Reynolds Mining Corp.
1911 Melrose Bldg.
Phone CApitol 8-8286
Houston, Texas

HELP WANTED

GRADUATE PETROLEUM ENGINEER—Oil company has opening at Midland, Texas, for aggressive field production engineer, under 38 years of age, with minimum of two years' West Texas experience plus proven ability in testing, drill stems, workovers and completions. P. O. Box 3053, Dallas, Texas.

PETROLEUM ENGINEERS—Want young engineers with up to four years' experience in drilling, production or reservoir work for immediate employment in Rocky Mountain Area and other points. Salary commensurate with experience and training. Our employees have been advised of this employment offer. Box J-197, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT oil and gas company desires to hire petroleum engineer to supervise production and well completion of gas and oil properties in East Texas, Louisiana. Immediate opening. All replies confidential. Box J-228, The Oil and Gas Journal, Tulsa, Oklahoma.

DISTRICT GEOLOGIST wanted by established oil company for employment in West Central Texas Area. Must have performed the administrative duties of the position and have from seven to ten years of practical geological experience, preferably in the area mentioned. Salary will be commensurate with ability and experience. Reply should state age, education, experience and starting salary desired, and interview will be arranged only upon receipt of such personal data. All replies will be treated in confidence. Our employees know of this advertisement. Reply Box J-220, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTIMATORS

Experienced in Process Equipment and piping costs, for Chemical Plant & refinery construction. Position offers good future with progressive Penna. firm. Send resume to

T-95, P. O. BOX 3495
Philadelphia 22, Pa.

SALES ENGINEERS

Capable of representing country's leading manufacturer of engines for oil field pumping and other auxiliary services. Excellent opportunity for high caliber man. Headquarters Tulsa, territory Mid-Continent. Opening immediately. Please give transcript of experience, and state salary expected. All replies will be treated confidentially.

Box J-209, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVES WANTED:

Manufacturer of Oil-Gas Separating, Treating, and Metering Equipment wants commission Sales Representatives for (1) North Texas (2) East Texas, Southern Arkansas, Northern Louisiana (3) South Texas (4) Texas Panhandle (5) Williston Basin (6) Illinois, Indiana, Kentucky (7) California (8) Canada. Territories available on exclusive contract basis to qualified and experienced men. Please give details concerning present sales coverage, lines handled, and sales personnel when answering.

Box J-231, The Oil and Gas Journal, Tulsa, Oklahoma

DESIGN ENGINEERS

Permanent Opportunities With

McKEE

In Our REFINERY, METALS or INDUSTRIAL Divisions
at our
Cleveland, Ohio Offices

McKEE with more than 50 years of successful operation, doing business all over the world; is one of the largest, oldest and best known engineering and contracting firms in the business. The McKEE organization continues to grow and expand, thereby offers many present and future opportunities for qualified and experienced engineers and designers in the following fields:

PIPING STRUCTURAL STEEL CONCRETE PROCESS HEATERS EQUIPMENT SPECS.
Also
ELECTRICAL DRAFTS. LAYOUT ENGINEERS PROCESS ENGINEERS

Applicants should have at least five years' of experience.

Here is a rare opportunity for you to utilize your engineering abilities and talents.

McKEE offers top compensation commensurate with experience and ability. No age limitations.

Transportation & Moving Allowances.

PLEASE SEND RESUME TO:
Edward A. Kolner

ARTHUR G. McKEE & CO.
2300 Chester Ave., Cleveland 1, Ohio

PLANT EQUIPMENT INSPECTORS

Senior inspectors for company operation in Saudi Arabia and company engineering department in The Hague, Holland. Should be graduate engineers with minimum 8 years' experience in design or inspection of petroleum processing plants and equipment, 5 years' actual inspection experience necessary.

In Saudi Arabia—will advise operating department on code and equipment limitations, develop inspection method, supervise and conduct inspections.

In The Hague—will inspect and approve equipment and material purchases, advise and assist foreign manufacturers to comply with U. S. Standards and Specifications.

Salary commensurate with education and work experience. Write giving full particulars regarding personal history and work experience.

Recruiting Supervisor, Box 72

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

HELP WANTED

PETROLEUM ENGINEERS

Graduate petroleum engineers with 3 to 5 years' experience wanted by MAJOR OIL COMPANY for work in the Mid-Continent and Gulf Coast areas In reply, please give resume of experience and salary expected.

BOX J-194, THE OIL AND GAS JOURNAL, TULSA, OKLAHOMA.

HELP WANTED

POSITION AVAILABLE

REFINERY SUPERINTENDENT AND ASSISTANT TO THE MANAGER

for new refinery recently completed in Western Canada. Must have at least three to five years Asphalt Refining experience. Salary open. Reply in detail giving educational background, refinery experience, together with three industry and three personal references. Please enclose picture.

Address replies to

REFINERY OFFICE,

Room 611, Northern Hardware Building,

Edmonton, Alberta, Canada.

SITUATIONS WANTED

ENGINEER-GRADUATE. Seven years design and construction experience with major gas transmission company. Desire change for better compensation and future. Box J-247, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION INDEPENDENTS: Graduate Engineer. Age 31, production superintendent caliber, now with major in Permian Basin. Available January 15. Box J-230, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL. Petroleum and Natural Gas Engineer desires position representing equipment company in oil field sales application engineering. Box J-239, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—Nineteen years seismic experience. Thoroughly experienced in supervision of crews in Rocky Mountain and Mid-Continent areas. Box J-236, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERVISIOR for Independent. Petroleum engineer with 8-years diversified field experience in Gulf Coast-Mid-Continent area, including drilling, completions, evaluation, unitization, and water flood. Employed. Qualified to manage production department. Box J-237, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT: Age 32, Married, College Graduate. Five years diversified experience with major oil company. Desire position with independent or small oil company. References. Box J-222, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST. Nineteen years' experience Oklahoma, Texas and San Juan Basin. Eleven years as District Geologist. Able to supervise Geological Department. Box J-188, The Oil and Gas Journal, Tulsa, Oklahoma.

Airline pilot, over 7100 hours; Airline Transport Rating; age 36; background as Account Executive with advertising agency, radio publicity, sales. Just returned from three years in Saudi Arabia as Captain for Airline. Desires position as executive pilot with sales, promotion, or publicity connections. For references write **A. H. KEYS JR.**
14312 Millbrook Dr., Sherman Oaks, Calif.

SITUATIONS WANTED

LANDMAN: 20 years experience, contracts, leases and titles. Presently employed. Desire Southwest. Box 492, Clarksdale, Mississippi.

PRACTICAL RESERVOIR ENGINEER, 8 years diversified experience in completions, workovers, reservoir valuations and secondary recovery, desires opportunity to increase production for aggressive operator. Box J-243, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER with over 10 years drilling and production experience in Southern Louisiana. Desire affiliation with progressive organization. Box J-244, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE Petroleum Engineer-Geologist, 35, employed, registered. Seeks challenging position with independent, drilling contractor, or transmission company. Eleven years active varied experience with major and independent in Kansas, Oklahoma, and Texas. Box J-229, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER; 35, eleven years experience, drilling, production, and reservoir engineering in Gulf Coast. Desire aggressive major or independent. Any location. Box J-248, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER - GEOLOGIST, **fifteen years** diversified experience in **reservoir engineering**, production operations and **supervision**. Desires position with progressive small company or independent. Box **J-214**, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIRES RESPONSIBLE Oil Executive Position. Degrees B.S. Petroleum Geology, B.B.A., Major Personnel Management, also Petroleum Engineering, Oil and Gas Law. Experience in Seismograph Subsurface Geology, 5 years Oil and Gas Taxation with Federal Government. Box J-215, The Oil and Gas Journal, Tulsa, Oklahoma.

SCOUTING SERVICE

APPALACHIAN BASIN—Weekly scout reports, exploration and development: New York, Penna. & W. Va. For information write: H & R Scouting Service, Box 312, Coudersport, Pa.

ROYALTIES

IN THE HEART of the Williston Basin. Landowners Royalties in major company blocks. Landowners Royalties Company, Box 1225, Great Falls, Montana.

LEASE AND DRILLING BLOCKS

CONTACT A. L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Production.

OLD LEASE TO SALVAGE. Worth working over. H. A. Miller, Glasgow, Ky.

FOR SALE—Accepting bids on half section located in oil area in Rooks County, Kansas. Box J-240, The Oil and Gas Journal, Tulsa, Oklahoma.

MAJOR POOLS in Oklahoma; choice royalties offered, with large estimated reserves. A. S. Berry, P. O. Box 1383, Tulsa, Okla.

NEW OIL CORPORATION has 300 acre block with surface, subsurface & geophysical studies. Wish to contact capital to drill this acreage. Graythorn Oil Corp., phone DI 3-3392, 213 Kennedy Bldg., Tulsa 3, Oklahoma.

OFFSET DRILLING WELL to oil production. High gravity oil. ⅛—$550, ¼—$1,000. Through Sand. Fastest developing shallow field in state. L. Price, Coweta, Okla.

HAVE DRILLING DEAL IN ILLINOIS with wonderful geology, that I will sacrifice for $50 per acre, a one-eighth override, and three wells drilled to 3,000 feet within six months. Must be checked to appreciate its possibilities. Do not answer unless you are financially able to carry out the requirements.
Box J-206, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis, Mo.

Offset Drilling Locations

Experienced Oil Drilling Co.—owning producing oil leases—will drill you one or more wells directly offsetting good producing wells in Tulsa Co., Okla.—at actual cost—providing you equip and complete wells into tanks and pipeline—for a one half interest. Depth 1600'. Write

BOX J-241,

THE OIL AND GAS JOURNAL, TULSA, OKLAHOMA.

399 ACRE OIL LEASE. ONLY ¼TH MILE FROM 4000 BARREL DAY WELL. SIMPSON PRODUCTION 4800 FEET.

46 Gravity Oil. Southern Kansas. No dry holes between 4000 barrel well and my lease. Ideal for Tax deal for big Corporation. Perfect titles, good geology. I want action. Well started 120 days. Only five dollars an acre and ¼th Override, or fifteen dollars an acre and ⅛nd Override. Why take chances. Drill close to production. For details write

Box J-223,

The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES BUSINESS OPPORTUNITIES

ATTENTION:

This is being addressed to any major or independent oil company or group that has a background of experience in exploratory and exploitation work plus sufficient standing financially, to undertake exploratory work, under very acceptable conditions, in several foreign countries. This exploratory work would be in conjunction with an exploitation contract, terms of which will be included in the exploratory agreement.

All I require at this moment is the right to submit your name, with absolutely no commitment or obligation on your part. If the governments affected and the terms of the exploration and exploitation agreements meet with your approval, then we are in business. If they do not, then you have experienced no expense in time and money and step out of the picture entirely. You are being given the first right of refusal or acceptance. Writer will meet interested parties anywhere and anytime mutually convenient. Please address:

BOX J-242,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

WILL BUY good settled oil production from owners. $500,000 value or more preferred. J. R. Shipley, 3630 Camellia Dr., San Bernardino, Calif.

AGGRESSIVE Manufacturers agency calling on field production personnel has opening for additional account. Box J-246, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL AND GAS Property For Sale. $10,000 per Month Income, plus 5,000 acres undeveloped located in Jackson County, West Virginia. Box J-238, The Oil and Gas Journal, Tulsa, Oklahoma.

WE HAVE TEXAS CLIENT

Who has asked us to find them from 500 to 5000 barrels per day settled production, Texas, Oklahoma, Louisiana or New Mexico. Inspection can begin within 24 hours. Principals only and in strict Confidence.

COMBEST ROYALTY COMPANY
Amarillo, Texas

WANTED

OIL PROPERTIES WANTED. "Oil properties wanted, settled or semi-settled production of 100 to 2,500 barrels daily in Oklahoma and Kansas. Property must stand thorough inspection. Contact Morris Sitrin 1215 First National Building, Tulsa, Oklahoma with particulars.

WANT 1 TO 4 or more producing oil wells, fairly shallow, or shallow lease with proven locations. Send full details to 1175 California, San Francisco. PR 5-3944.

FARMS AND RANCHES

FOR SALE

STOCK RANCH in western Montana with its timbered mountains, beautiful streams and lakes, delightful summers, mild winters and WATER UNLIMITED. Truly "God's Country." 1200 acres. Lots of irrigation water at low cost. River frontage. Irrigated pastures for 500 cows which can be increased. New ultra modern ranch style home. Guest house and separate tenants buildings. Ranch and buildings in excellent condition. Good hunting and fishing in nearby mountains. Wonderful location—less than 10 miles from Missoula—a modern city of 30,000 and home of Montana State University. Transportation facilities—2 transcontinental railroads, U. S. Highways No. 10 and 93, and Northwest Airlines. Price $220,000. One-half cash.

H. H. OTTMAN COMPANY
Missoula, Montana.

WELL RECORDS

FOR SALE—50,000 well completion cards 5 year set covering a 75 county area in North Central and West Texas. Box J-207, The Oil and Gas Journal, Tulsa, Oklahoma

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

OIL FORMS

KRAFTBILT FORMS, designed especially for the oil industry, are popular because they are efficient, economical. For plat sheets, well log strips, columnar pads, all production reporting forms, material transfers, truck reports, all administrative forms, ask for new Catalog 1154-K. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

MAP STICKS

ELIMINATE YOUR MAP-HANDLING PROBLEMS! Simply roll your maps on Kraftbilt All-Plastic Snap-On Map Sticks and hold in place with light-weight resilient plastic clips. Bright colored Index Flags plug in one end of each stick, carry labeled identity and instantly "flag" the map you want. Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

Equipment Men

Ampco Appoints Five New Pump Distributors

The appointment of five new pump distributors has been announced by Ampco, Metal, Inc., Milwaukee, Wis. The appointments are: Will Process Equipment Corp., Rochester, N. Y.; Condit Co., Tulsa; A-L Machine & Equipment Co., Franklin Park, Ill.; Rawdon Myers Agency, Cincinnati, Ohio; and Paul B. Duggan, Chicago.

All are franchised to supply the new Series D Ampco centrifugal pumps and the established Z type as well as parts for both models. These pumps are designed to give high efficiencies in the moving of corrosive liquids under most conditions.

Acme Oil Tool Purchases Hobbs Rental Tool Firm

Acme Oil Tool Co., Oklahoma City, has assumed control of Me-Tex Supply Co., Hobbs, N. M. The machine-shop and rental-tool facilities of Me-Tex are being added to the facilities of Acme.

The Hobbs branch of the tool company will be operated as Acme-Metex Tool Co., Inc., and will be managed by Don Burner.

Acme Oil Tool Co. was formed in 1938 with only the Oklahoma City shop. Since then the company has expanded with facilities being added in Healdton, Okla. Also operating under Acme control are Wichita Falls Fishing Tool Co. and Great Bend Fishing Tool Co. Great Bend operates branch shops in Borger, Tex., and Liberal, Kans.

Until recently, Burner has been chief design engineer for the company. He was formerly associated with the Skelly Oil Co.

Shand & Jurs Announces Sales Organization Shifts

To keep pace with the growing demands on its branch-office sales personnel, Shand & Jurs Co. has announced the following changes and moves:

J. J. Connelly is being transferred from the New York office to the Chicago branch. W. E. Meneley will be transferred from a research-engineering position in the Berkeley plant to sales engineering in the New York office.

Connelly, who started with the company in 1954, will assume duties as sales engineer covering the midwestern territory, assisting R. W. Blake, manager, and H. M. Durlam, assistant manager of the Chicago office.

Meneley has a wide background of experience in the oil industry as well as 2 years of experience at the factory and main office of Shand & Jurs.

LEGAL

SEALED BIDS FOR OIL AND GAS leases on the Crow Indian Reservation, Montana, will be received in the Office of the Superintendent, Crow Indian Agency, Crow Agency, Montana, until 2:00 o'clock (M.S.T.), Wednesday, December 7, 1955 at which time they will be opened and publicly read. Twenty (20) Units involving 7,212.73 acres of trust Indian Lands, a portion of which mineral rights are reserved for the benefit of the Crow Tribe by Act of Congress, will be offered. For further detailed information and list of lands advertised call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

ADVERTISERS IN THIS ISSUE

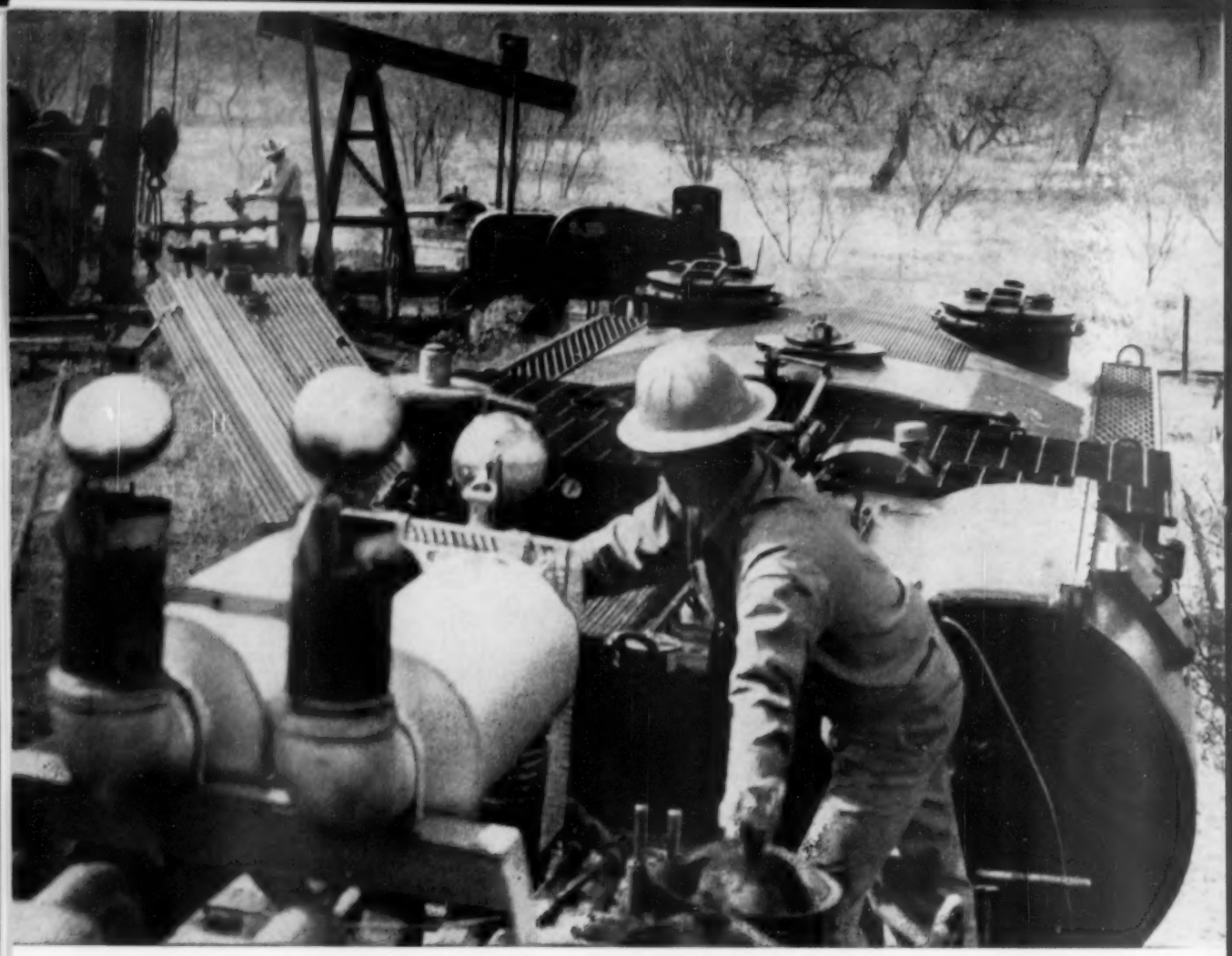
Aerofin Corporation 238
Ajax Iron Works 84
Allis-Chalmers Mfg. Co. 106
Allen Foundry & Machine Works, Inc. 273
American Brass Co., The 249
American Cable Division of American Chain & Cable 227
American Hoist & Derrick Co. 271
American Iron & Machine Works Co. 255
American Meter Company 35
Automatic Electric Sales Corporation 101
Avondale Marine Ways, Inc. 91
Axelson Manufacturing Company, A Division of U. S. Industries, Inc. 12
B and W Inc. 283
Baash-Ross Tool Company 285
Babcock & Wilcox Company—
Boiler Division 52
Tubular Products Division, The 90
Baker Oil Tools, Inc. 112
Beaird Company, Inc., The J. B. 23
Bethlehem Supply Co. 27
Black, Sivalls & Bryson, Inc. 82
Bos-co Equip't Eng'r'g & Mfg. 254
Bovaird Supply Co., The 34
Bower Roller Bearing Company 43
British Petroleum Company Limited, The 246
Brodie Co., Inc., Ralph N. 78
Buckwyn Constructions Ltd. 250
Cameron Iron Works, Inc. 187
Carbide and Carbon Chemicals Company, A Division of Union Carbide and Carbon Corporation 76
Catalytic Construction Company 79
Champion Spark Plug Company 226
Chase Brass & Copper Co. 244
Chicago Bridge & Iron Company 163
Chicago Pneumatic Tool Company 75
Clark Bros. Co. One of the Dresser Industries 80, 81
Clark Equipment Company, Construction Machinery Division 73
Classified Advertising 304, 305, 306, 307, 308
Claymont Steel Products Department, Wickwire Spencer Steel Division, Colorado Fuel and Iron Corporation 20
Coates Field Service, Inc. 213
Comptoir Franco-Belge D'Exportacion Des Tubes D'Acier 8
Construction Machinery Co. 189
Continental Motors Corp. 58
Continental Supply Co., The 13, 14, 99
Cooper, Inc., Fred E. 210, 252, 253, 272
Core Laboratories, Inc. 260
Corrosion Services Incorporated 287
Crose Manufacturing Co., Inc., M. J. 221
Crouse-Hinds Company 57
Cutler-Hammer, Inc. 66
D-B Division Emsco Manufacturing Company 99
Dearborn Chemical Company 21
De Laval Steam Turbine Co. 235
Delta Tank Manufacturing Co., Inc. 53
Deming Company, The 192
Detroit Diesel Engine Division, General Motors Corp. 68
Diamond Oil Well Drilling Company 268
Dowell Incorporated 208, 310
Drayer-Hanson, Inc. 100
Dresser Industries, Inc. 176, 177
Drilling & Service, Inc. 290
du Pont 41, 42
Edwards Limited, F. J. 255
Edward Valves, Inc. 223
Emsco Manufacturing Company D-B Division 99
Enardo Manufacturing Company 277
Fabri-Valve Company of America 250
Fairbanks, Morse & Co. 4, 248
Farrel-Birmingham Co., Inc. 232
Felt Products Mfg. Co. 224
Fisher Governor Company 18, 19
Fisher Research Lab., Inc. 254
Floridin Company 191
Foster Wheeler Corporation 88, 89
Franks Division, Cabot Shops, Inc. Inside Back Cover
Fuller Company 30
Fulton & Company, R. H. 216
General American Transportation Corporation 110
General Controls 44
General Electric Company 95, 96, 97, 98
Glidden Company, The 258
Glitsch & Sons, Inc., Fritz W. 193
Globe Oil Tools Company 222
Goodrich Company, B. F. 5
Gorman-Rupp Company, The 284
Goslin-Birmingham Manufacturing Co., Inc. 230
Goit Mfg. Co., H. P. 202
Grancell, I. H. 223
Graver Tank & Mfg. Co., Inc. 114, 115
Grove Valve and Regulator Company 85
Guiberson Corporation 17
Halliburton Oil Well Cementing Co. 15, 269
Hammond Iron Works 26
Harris, Upham & Co. 283
Harvey & Co., Ltd., G. A. 236
Hawthorne, Inc., Herb J. 271
Helicoid Gage Division, American Chain & Cable Co. 257
Huey & Co., S. E. 213
Hughes Tool Co. Back Cover
Hughey & Phillips, Inc. 254
Humble Oil & Refining Co. 282
Hycon Aerial Surveys, Inc. 267
Inferno Co., The 224, 283
Infilco Incorporated 289
Ingalls Shipbuilding Corporation, The 286
Ingersoll-Rand 50, 51
Johns-Manville Corporation 229
Johnston Pump Company 270
Johnston Testers, Inc. 87
Jones & Laughlin Steel Corporation Supply Division 22
Jones Company, The S. M. 9
Kaiser Aluminum & Chemical Sales, Inc. 234
Kellogg Co., The M. W. 64, 65
Kerrigan Iron Works, Inc. 251
Kinzbach Tool Co., Inc. 255
Laughlin Division American Hoist & Derrick Co., Thomas 268
Le Roi Division of Westinghouse Air Brake Co. 62
Levingston Shipbuilding Co. 256
LimiTorque Corporation 86
Linde Air Products Company, A Division of Union Carbide and Carbon Corp 67, 228
Link-Belt Company 7
Lone Star Steel Company 103
Lucey Products Corporation 248
Lufkin Foundry & Machine Co. 10
Lufkin Rule Co., The 271
Mack Trucks 70
Magnet Cove Barium Corp. 175
Maloney-Crawford Tank and Manufacturing Co. 276
Manzel Division of Houdaille-Hershey Corp. 213
Marlow Pumps Division of Bell & Gossett Company 39
Marsh Instrument Co. 47
Martin-Decker Corp. 275
Martin, Manufacturer, John N. 24
McCullough Tool Company 262
Mercoid Corp., The 196
Mid-Continent Supply Company 83
Midwest Piping Company, Inc. 45
Mission Mfg. Company 206, 207
Moore Corporation, Lee C. 102
Moorlane Company 217
Mueller Co. 25
Mutual Chemical Division Allied Chemical & Dye Corporation 194
National Airoil Burner Co., The 231
National Aluminate Corp. 225
National Bank of Tulsa 239
National Supply Co., The 291, 292, 293, 294
Nicolet Industries, Inc. 242
Nordberg Mfg. Co. 32, 33
Nordstrom Valve Division, Rockwell Manufacturing Company 63
North American Car Corporation 92
Northwest Engineering Company 71
Oakite Products, Inc. 247
Ohio Injector Company 56
Oil and Gas Journal, The 202
Oil Center Tool Co. 40
Oil Well Supply Division 6
Olin Mathieson Chemical Corporation, Industrial Chemicals Division 54, 55
Otis Pressure Control, Inc. 107
Paris Distributor, Inc., Henry H. 279
Parkersburg Rig & Reel Co. 190
Peerless Mfg. Co. 72
Peerless Supply Co. Inc. 224
Perrault Equipment Company 214
Petreco a Division of Petrolite Corporation 81
Petro-Chem Development Co., Inc. 218
Petroleum Distributing Co. 259
Philadelphia Gear Works, Inc. 86
Phoenix Manufacturing Company 250
Powell Valves 48
Precision Scientific Company 108, 109
Price Company, H. C. 171
Ratigan, Inc., J. P. 254
Raybestos-Manhattan, Inc., Packing Div. 259
Reda Pump Company 275
Reed Roller Bit Company 264
Refinery Engineering Company 69
Refinery Supply Co., The 242
Republic Flow Meters Co. 60
Republic Rubber Division of Lee Rubber & Tire Corp. 233
Republic Steel Corporation 104, 105
Reynolds Metals Company 46
Ridge Tool Company, The 245
Rockford Clutch Division of Borg-Warner Company 199
Rockwell Manufacturing Company Inside Front Cover
Roebling's Sons Company, John A. 94
Schlumberger Well Surveying Corp. 93
Scott-Rice Company 224
Shand & Jurs Co. 178
Sillers Engineering Co. 72
Socony Mobil Oil Company, Inc. 213
Spang & Co. 288
Standard Oil Company of California 188
Technical Oil Tool Corporation 281
Templeton, Kenly & Co. 224
Thermoid Company 31
Thomas Flexible Coupling Co. 186
Thompson Tank & Manufacturing Co., Inc. 202
Thompson Tool Co. 280
Thornhill-Craver Co. 212
Timken Roller Bearing Company 11
Toledo Pipe Threading Machine Co. 211
Torrington Company, The 77
Tretolite Company A Division of Petrolite Corporation 59
Union Carbide and Carbon Corporation, Carbide and Carbon Chemicals Company 76
Linde Air Products Company 67, 228
Union Tank and Supply Company 108
United States National Bank 274
United States Steel Corporation—Oil Well Supply Division 6
United Supply & Manufacturing Co. 240
Universal Oil Products Co. 36, 37
Valley Electric Corp. 284
Vapor Recovery Systems Co., The 243
Vickers Incorporated 38
Victor Products Corp. 254
Vogt Machine Co., Henry 28, 29
Wallace & Tiernan Products, Inc. 266
Warner Lewis Company 16
Warren Petroleum Corporation 166
Watson-Stillman Fittings Division H. K. Porter Company, Inc. 215
Waukesha Sales & Service, Inc. 74
Welex Jet Services Inc. 116
Well Equipment Mfg. Corp. 237
Wheeling Machine Products Company 200
Whitmor Homebuilders Inc. 278
Williams & Co., J. H. 219
Williams Brothers 220
Williamson, Inc., T. D. 195
Wilson Manufacturing Co., Inc. 49
Youngstown Sheet and Tube Co. 13, 205

LEGAL

SEALED BIDS will be received until 2:00 P. M., Mountain Standard Time, November 30, 1955, and opened at that time in the office of the Superintendent, Blackfeet Indian Agency, Browning, Montana, for the leasing of 39,081.36 acres of Tribal land and 320.00 acres of allotted Indian land, located in Glacier County, Montana, for oil and gas mining purposes. The details of lease offerings and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Blackfeet Indian Agency at Browning, or call the Agency Land Office, Phone 2561, Browning. Charles S. Spencer, Superintendent.

LEGAL

SEALED BIDS will be received until November 17, 2:00 P. M. Mountain Standard Time, and opened at that time in the office of the Superintendent, Fort Belknap Consolidated Agency, Harlem, Montana, for the leasing of 13,247.33 acres of Tribal land and 12,826.23 acres of allotted Indian land located in Townships 31 and 32 North, and Ranges 22 and 23 East, Principal Meridian, Montana, County of Blaine, Montana for oil and gas mining purposes. For further detailed information and a list of lands advertised call or write: Darrell Fleming, Supt Fort Belknap Consolidated Agency, Harlem Montana



PETROJEL

Economical new DOWELL treatment uses thickened lease crude oil for low-fluid-loss fracturing medium

By thickening lease crude oil, diesel fuel or kerosene to make them suspend sand . . . Dowell's new, exclusive Petrojel* treatment offers you an economical fracturing service to increase oil production.

Dowell engineers can mix Petrojel materials to almost any desired thickness. They add chemical agents to almost any crude base, either in truck-mounted mixing tanks or in the operator's own lease tanks.

Performance-wise, Petrojel brings you the advantages of both low fluid loss and excellent resistance to thinning at bottom hole temperatures up to 200°F. Pumping through sand will not reduce Petrojel's carrying ability. The surface tension of the Petrojel fluid is less than that of its original base oil. Treatments to date have shown 500 to 2000 p.s.i. less pressure when pumping through tubing than that required with other fracturing media. Its fracturing job done, Petrojel is diluted by well fluids to near its original consistency, so that it returns easily to the well bore.

For service, or for more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Department K-11.

*Service mark of Dowell Incorporated

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

NOW A FIELD TESTED VALUE

FRANKS *Clipper*

. . . THE MOST COMPLETE AND STREAMLINED WELL SERVICING UNIT

The Franks Clipper is a unit basically built for servicing—the main job of the unit—but which is also self propelled, using the drawworks motor for road power.

One feature is that the Clipper heads into location making "spotting" much quicker and easier. The use of outriggers makes the unit more stable and assures operation without ground guylines.

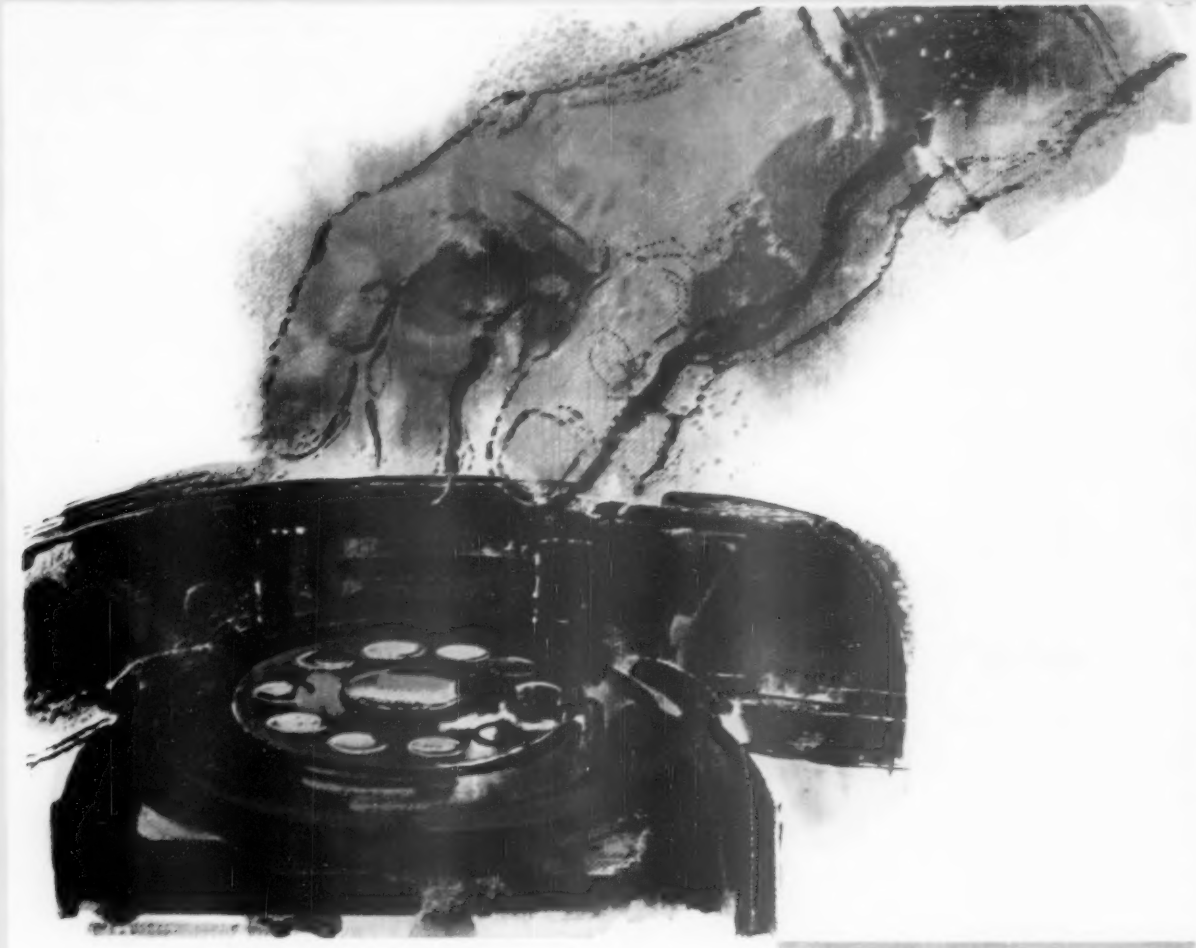
The Clipper moves completely strung-up and is the fastest location-to-location unit, rig-up and rig-down unit on the market. Franks unit is fully field tested. It will pay you to look at a Clipper before you buy.

FRANKS DIVISION
Cabot Shops, Inc.
Box 3218, Whittier Station
TUSA, OKLAHOMA

FRANKS
DIVISION CABOT SHOPS, INC.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

"ON THE SPOT" FIELD SERVICE

A DIVISION OF CABOT SHOPS, INC.



We're closer than your telephone....

At Hughes we like to feel that our rock bit service puts us closer than your telephone. For Hughes service requires that each field representative know *in advance* — through personal contact — the bit requirements of the rigs drilling in his area... and have the right bits on these rigs... *ahead of time!* Through our experienced service organizations we serve every active drilling area in the United States and Canada.